# AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

OCTOBER 1, 1957

*In This Issue*

Wraps Taken Off the Timken Automatic Plant
New Clutch Designs Must Pass Exacting Tests
Latest Rockets at the Farnborough Air Show
Assembling Electric Window Regulators
Standardized Military Engines at Continental
Dual-Drive Tandem for Heavy Duty Trucks

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A CHILTON PUBLICATION

*A new line of Standard Oil greases*

# RYKON

## GREASE

*Major breakthrough in grease technology results in development of new thickening agent. New grease has greater high temperature stability, superior multi-purpose qualities, improved lubricating properties.*

Standard Oil instituted a grease research and development project several years ago. The result of this work is the line of RYKON Greases, which contain a unique new non-soap, organic thickening agent.

RYKON Greases surpass in stability and performance the best greases made up to this time. They bring to industry new opportunities for improved machine performance. They greatly reduce the maintenance and grease handling problems encountered in industry.

### RYKON Grease properties

RYKON Greases are smooth, buttery-textured greases, made from the finest quality, solvent-extracted oil. Their thickening agent is a Standard Oil exclusive. RYKON Greases have these high-quality characteristics:

**High temperature stability**—Better heat stability than any other petroleum oil grease. ASTM dropping point of 480°F. Maintain consistency in service at high temperatures.

**Mechanically stable**—Maintain consistency even under severe mechanical working in service.

**Chemically stable**—Inhibit oxidation. Oil and thickening agent in combination possess extremely good chemical stability.

**Wide temperature range**—Lubricate at high and low temperatures. Extended range of application thus obtained makes RYKON Greases truly multi-purpose.

**Water resistance**—Do not lose consistency in presence of water. Highly resistant to water washout.

**Oil separation**—Minimum bleeding of oil in service and storage.

**Anti-rusting**—Exceptional natural rust preventive characteristics.

With RYKON Greases, lubrication can become simple, foolproof and less expensive—much less expensive, perhaps, than a single shut down caused by equipment failure due to the use of the wrong type of grease or the use of an "economy" grease lubricant.

RYKON Greases come in four Regular and three Heavy-Duty grades. Thus there is a RYKON Grease to take care of every grease lubrication job. Using RYKON Greases plant-wide can reduce your grease storage requirements, simplify lubrication maintenance training, cut down record keeping, save on dispensing equipment and reduce investment in grease inventories.

Get more facts about RYKON Greases. Call your nearby Standard Oil industrial lubrication specialist in any of the 15 Midwest or Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

### Check Chart Of RYKON Greases

| Regular Line | Grade Consistency |
|---|---|
| RYKON Grease No. 0 | 0 |
| RYKON Grease No. 1 | 1 |
| RYKON Grease No. 2 | 2 |
| RYKON Grease No. 3 | 3 |
| **Heavy Duty Line** | |
| RYKON Grease No. 0 E. P. | 0 |
| RYKON Grease No. 1 E. P. | 1 |
| RYKON Grease No. 2 E. P. | 2 |

STANDARD

**STANDARD OIL COMPANY** (Indiana)

# COTTA TRANSMISSIONS

## serve you better, longer!

Here's the kind of work Cotta Transmissions are made for: rugged, heavy loads . . . variable torque conditions . . . dependable operation required!

This 35 ton Coal Recovery Drill, manufactured by The Salem Tool Company, Salem, Ohio, bores 42″ dia. holes into the highwall . . . breaks up the coal and delivers it to the conveyor at a rate of 400 to 500 tons a day. A mobile power unit rotates the auger and thrusts it 200 feet into the vein. Cotta's Model G2U Heavy-Duty Transmission provides a reduction in both forward and reverse speeds . . . meets extreme torque conditions . . . takes heavy, intermittent shock loads *in stride!*

If you have an application on heavy equipment . . . cranes, locomotives, drillers, shovels, etc. . . . with input torque from 150 to 2000 foot pounds, Cotta standard or "engineered-to-order" Power Transmissions will serve you better, longer . . . give you outstanding performance at low cost!

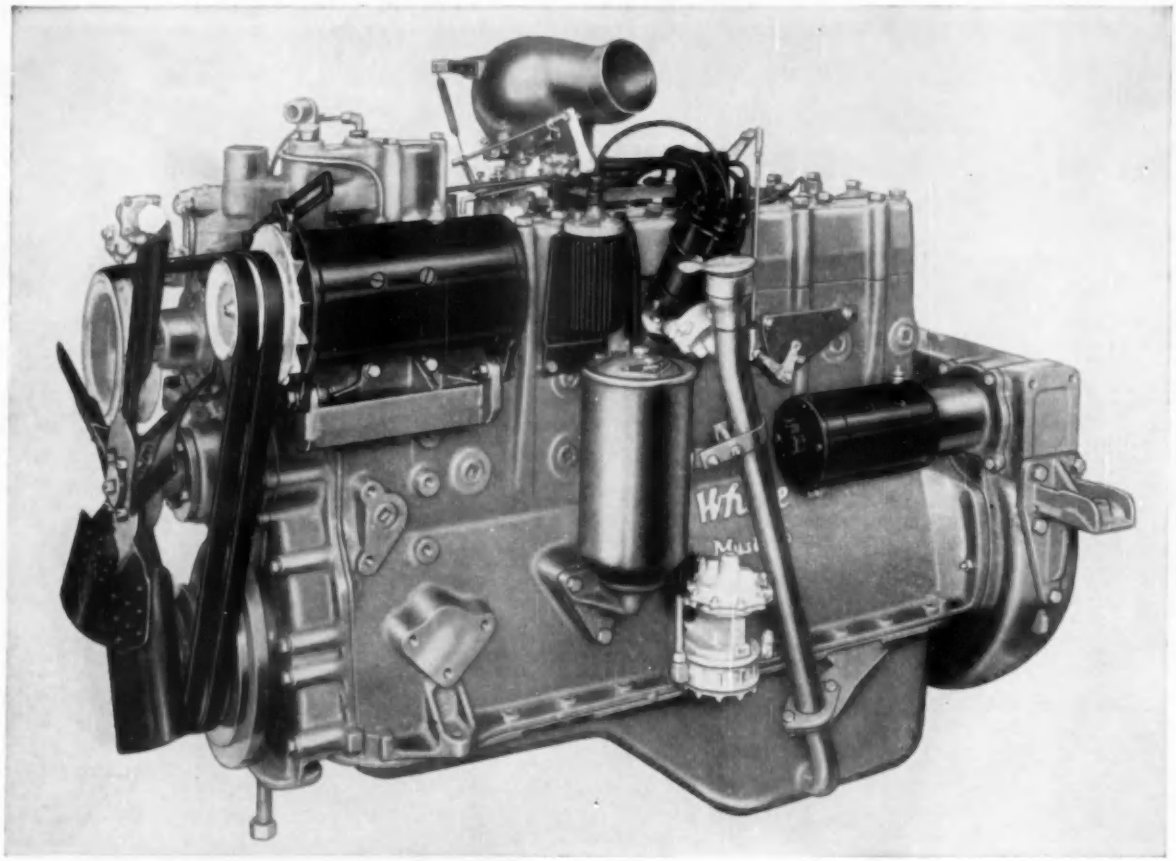
**THIS INFORMATION WILL HELP YOU**

Diagrams, capacity tables, dimensions and complete specifications sent free on request. Just state your problem—COTTA engineers will help you select the right unit for best performance. May we work with you?

***COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS***

An Assurance of Dependable Service

**COTTA**
**HEAVY-DUTY**
**TRANSMISSIONS**
*"Engineered-to-order"*



**The 400-Mustangs** drive White's 3000, 4000, and 9000 series tractors. In these vehicles they are giving outstanding operating economy . . . due in part to White's use of Nickel cast iron blocks.

*Newest White Mustang!*

# Extra strength of Nickel cast iron gives her extra "go"

This is a powerful, rugged engine . . . built for maximum "go" with minimum maintenance in day-in, day-out tractor trailer service.

White Motor Company builds it. It's one of their new 400-Mustangs (145, 160, 200, 215 HP). As in earlier Mustangs, blocks for the long-lasting 400s are made of a Nickel cast iron.

## Nickel cast iron meets 4 design needs

White's traditional reliance on Nickel cast iron blocks for the Mustangs is soundly based on four design needs.

**Extra strength** Nickel cast iron gives the light, "pillar—type" Mustang block the extra strength needed for long, reliable heavy-duty service.

**Pressure tightness** With Nickel cast iron the complex block can be reliably cast with the pressure tightness needed in these high compression engines.

**Extra wear resistance** Nickel cast iron provides the improved wear resistance for this powerful engine.

**Machinability** Nickel cast iron gives White fast, easy machining. Its high strength is not obtained at a sacrifice in machinability and production costs are held down.

INCO NICKEL

**From the fleet operator's view point . . .**
The light weight Nickel cast iron blocks in the Mustang improve operating economy, reduce maintenance and replacement costs, cut road side repairs.

If you buy or build internal combustion engines, look into the advantages of Nickel iron castings . . . for blocks, heads, flywheels, crank cases, camshafts, manifolds and other parts. Write for Inco's helpful "Guide to the Selection of Engineering Irons."

**THE INTERNATIONAL NICKEL COMPANY, INC.**
67 Wall Street New York 5, N. Y.

INCO
TRADE MARK

# AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE PUBLISHED SEMI-MONTHLY

OCTOBER 1, 1957 VOL. 117, NO. 7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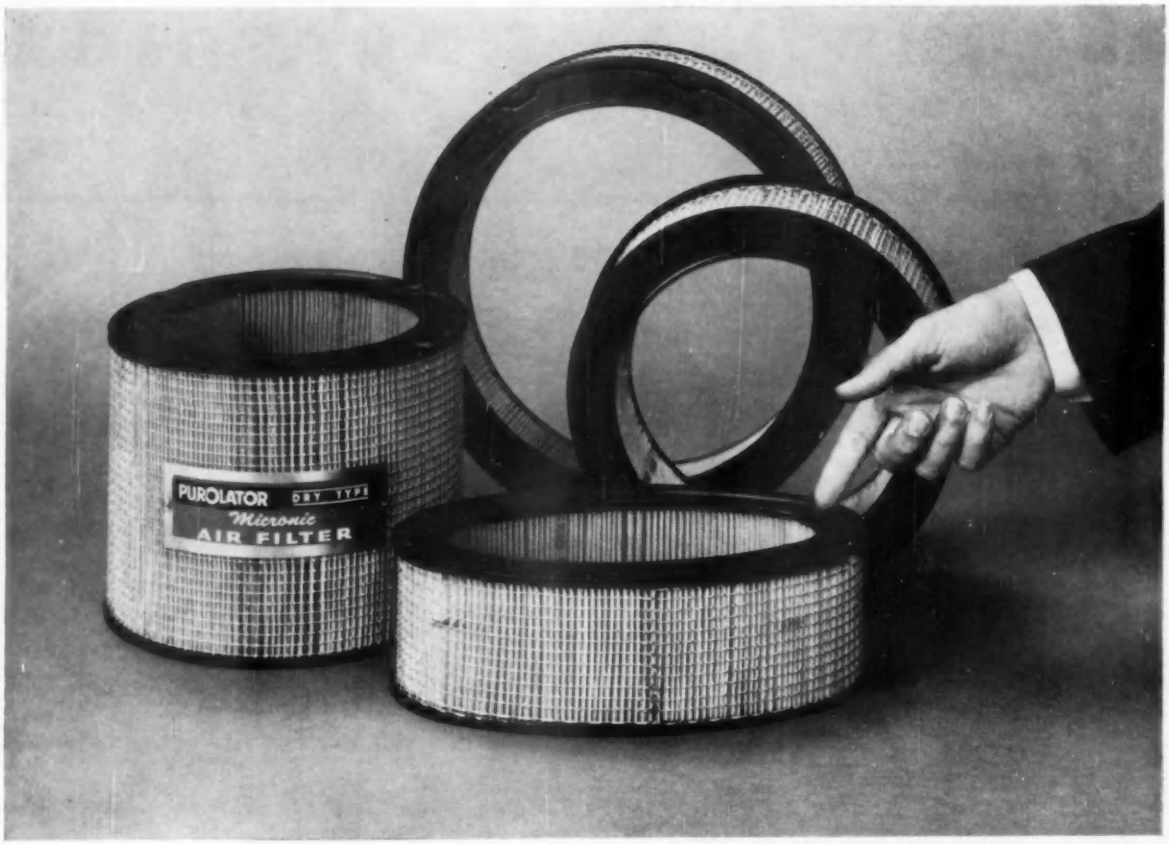
***Another new development using***

# B.F.Goodrich Chemical *raw materials*




*Dry type Micronic air filters are mady by Purolater Products, Inc., Rahway, N. J. in a variety of shapes to meet automotive requirements. End rings made from Geon supplied by B.F.Goodrich Chemical Company stay strong and flexible despite severe service.*

## Geon materials simplify air filter design

THESE dry-type Micronic automotive air filters were formerly made by assembling the filter element with metal end rings. This required a cementing operation, and a gasket was needed for sealing.

Now the end rings are formed by simply dipping the filter element into a mold containing a plastisol based on a Geon polyvinyl material. This eliminates the metal fastening operation, and since the plastic is moderately flexible, no gasket is required. In addition, with this design the manufacturer finds it more economical to tool up for the many sizes and shapes of filters needed in different cars.

Geon polyvinyl materials offer outstanding properties—resistance to water, oil, most chemicals, to wear and abrasion. And they are easily formed by molding, extrusion, calendering, casting, etc. For ideas on using Geon to advantage in your products, write Dept. HJ-5, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

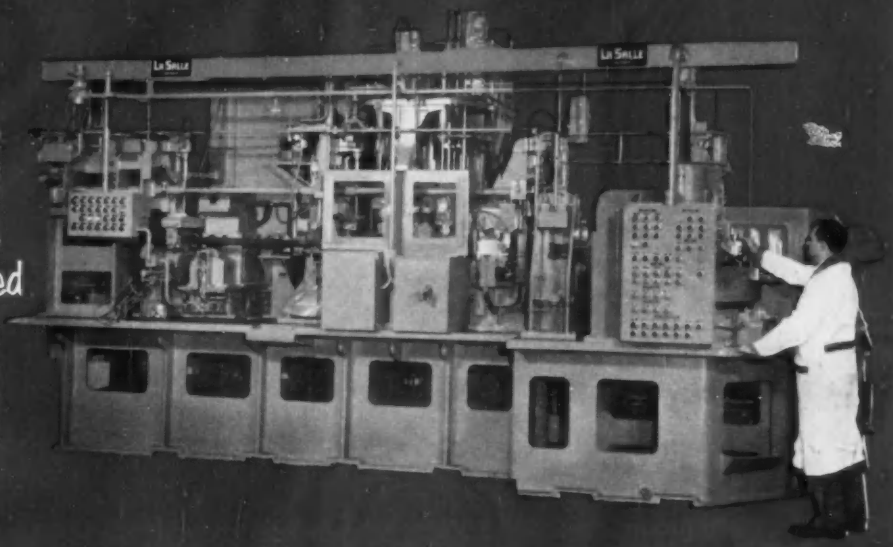
**B.F.Goodrich Chemical Company**
a division of The B.F.Goodrich Company

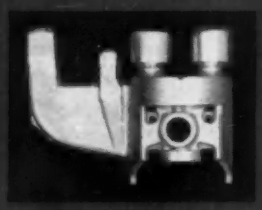
**B.F.Goodrich** GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors

# La Salle dial-inline-amatic

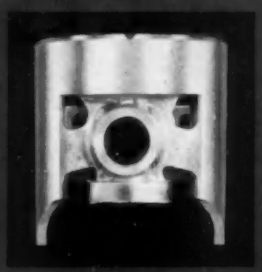
# New Automated Piston Line

*a dial type machine and an in-line type machine combined to form a single fully automatic unit!*





PERMANENT MOLD



MACHINED PISTON

**fully automated 14-station unit**

The pistons, as they come from the mold, are fed, on conveyor, directly to this new unit. They pass thru 5 stations in the "Dial Type" section, and 9 stations in the "In-Line Type" section of the machine. And, the pistons are never slid, rolled or bumped.

**series of operations performed**

It mills off the gates and risers; pierces the wrist pin hole, and the window around the wrist pin hole; hollow mills the piston OD; faces the piston head; faces, and chamfers the skirt of the piston; weighs, and gages each piston; and, rejects pistons found to be over size, over weight, under size or under weight.

**produces 400 pistons per hour**

Furthermore, this unit will handle, any one of 3 different pistons, merely by changing the position of the selector switch, and the fixture locaters.

**maximum flexibility for model changes**

The shuttle mechanism can be adjusted for different size and shaped pistons, which automatically allows for future parts design changes.

**unitized construction**

It's built to J.I.C. Hydraulic and Electrical standards. There's automatic lubrication throughout. And, there is a chip conveyor provided in the base of the unit.

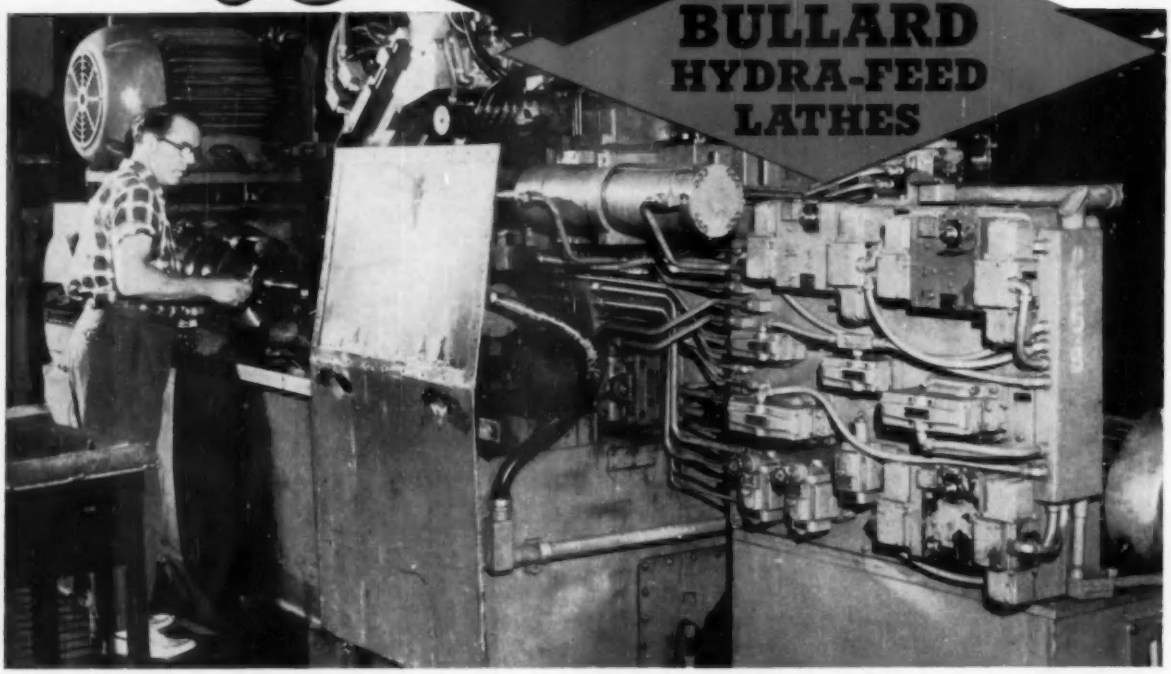
**La Salle tool, inc.** ENGINEERING & BUILDING SPECIAL MACHINERY

3840 EAST OUTER DRIVE • DETROIT 34, MICHIGAN

# saves 75% on changeover time with . . .

simplified set-up

on BULLARD HYDRA-FEED LATHES



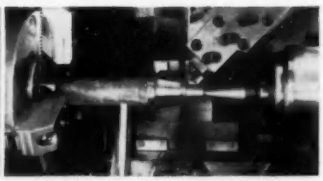
Illustrated below is one of more than forty different pinions processed on the same Bullard Hydra-Feed Lathes.

"Unless the consecutive set-ups from one job to another were similar," reports the Foreman of a large midwestern automotive parts manufacturer, "changeover set-ups took from ten to sixteen hours. But now, with Bullard Hydra-Feed Lathes, and going from one extreme to the other, **the changeover is accomplished in less than four hours.**"

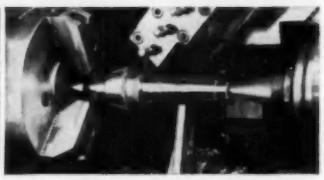
Additional reasons for their enthusiastic acceptance of Bullard Hydra-Feed Lathes include less spoilage, greater accuracy, better finishes and reduced machining time over previous method.

These advantages can be applied to your machining requirements. Call your nearest Bullard Sales Office for full particulars or write

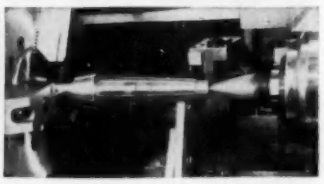
FIRST CHUCKING



SECOND CHUCKING

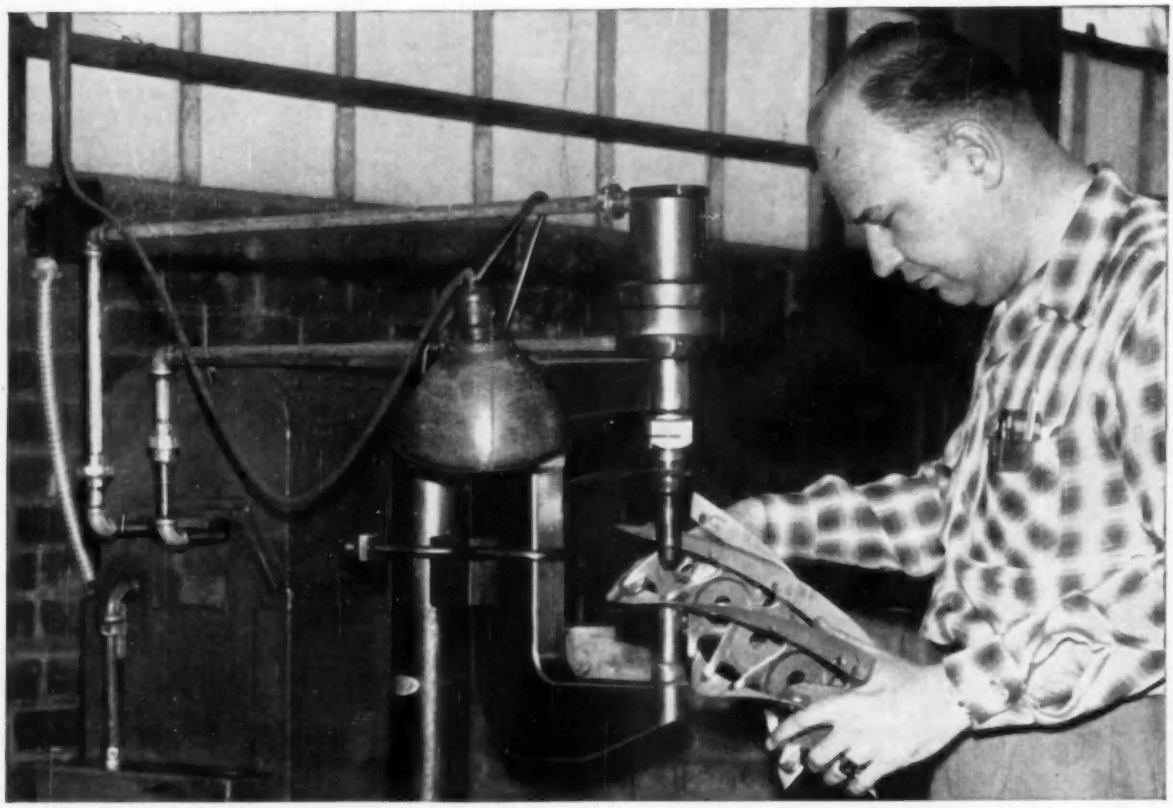


FINISHED PIECE



**THE BULLARD COMPANY**
**BRIDGEPORT 9, CONNECTICUT**

*Remember*—to cut costs when cutting metal—buy BULLARD



*Courtesy Eclipse Lawn Mower Company, Prophetstown, Illinois*

# HOW TO MAKE A BETTER ASSEMBLY CHEAPER

## RIVETING THE "HY-POWER" WAY

Lawn mower blades must be fastened to the reel tightly and *in perfect alignment* to assure product performance and acceptance. That's why the Eclipse Lawn Mower Company, Prophetstown, Illinois (as well as many other leading lawn mower manufacturers), uses Hannifin "Hy-Power" cold-squeeze riveting.

### What's your assembly problem?

If you haven't investigated fast, safe, clean cold-squeeze riveting, perhaps you should! Parts are drawn tightly together under quiet, relentless hydraulic pressure. Rivet shanks expand to fill the hole completely, making the tightest joint possible; heads are formed to any shape and every rivet is identical. And, with this modern push-button-controlled method, operators need no special training to apply it.

"Hy-Power" Riveters are available, standard or special, for portable use or in fixed mountings, as shown. Power source is the exclusive Hannifin "Hy-Power" Hydraulic Pressure Generator—so dependable that the first model, made nearly 20 years ago, is still in daily use.

### ONE RIVET AT A TIME OR SEVERAL!

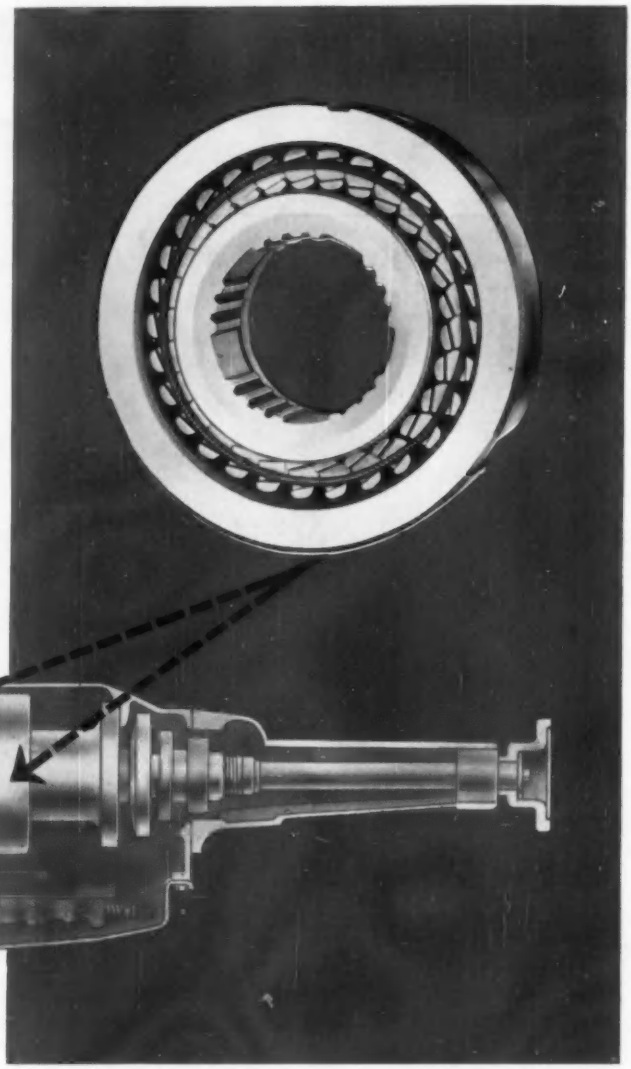
Hannifin "Hy-Power" Riveting is ideal for multiple installations where several "Hy-Power" Cylinders—available in capacities from 7½ to 100 tons—advance, rivet and retract in unison. Your Hannifin representative is anxious to help you select exactly the "Hy-Power" installation you need. Why not call him in? Meanwhile, get the full story by writing for Bulletin 150.

# HANNIFIN

Hannifin Corporation, 543 S. Wolf Road, Des Plaines, Illinois

Air and Hydraulic Cylinders • Hydraulic Presses • Pneumatic Presses • "Hy-Power" Hydraulics • Air Control Valves

# What a difference a D* makes...



IN SPRAG-TYPE CLUTCHES
FOR AUTOMATIC TRANSMISSIONS

Automotive design demands component parts be stronger, lighter and smaller. Terms such as as high capacity—less space—lightweight are familiar to automotive engineers and designers. These requisites are met by Formsprag for all automotive over-running clutch applications. With the Formsprag patented D-shaped sprag, a full complement of sprags may be used resulting in "higher capacity", "less weight" and "less space" than with any other type of over-running clutch.

In addition, D-shaped sprags are self-spacing, act independently and share the load equally. Moreover they allow insertion of a *full complement* of sprags in far less space. So, more engine torque can be transmitted per cubic inch of clutch displacement with Formsprag than by any other type of over-running clutch.

*In addition to the D-shape, Formsprag employs other sprags such as the "double D" used in special high speed applications.

Your Formsprag sales engineer will be pleased to discuss special purpose sprags with respect to your over-running clutch application.

## FORMSPRAG COMPANY

**23583 HOOVER ROAD, WARREN (DETROIT) MICHIGAN**

*The only clutch that can give you full-complement performance.*

58-P

1½ times actual size

# 220 MILLION PIECES

## FROM THIS 12-STATION TOOL STEEL DIE

Photo courtesy of Warner Die & Stamping Co., Cary, Illinois, makers of this die.

Tolerances on the intricate shaft-mounted spring shown here are plus .003", minus .000" . . . no burrs allowed . . . and stamping speed is better than 240 a minute. This calls for die-making precision—and a precision die set.

Reliable, consistent precision of the Danly Die Set provides the closure accuracy necessary to the performance of this fine die. After this unusually long run of a precision stamping in a tool steel die, the die set is in good condition.

Danly production methods consistently maintain the highest standards of die set precision through individual control of every critical dimension. Thousands of fine tool and die shops agree that the finest die set obtainable is usually the lowest cost insurance on any die-making investment. Find out how Danly precision can save money for you.

DANLY®

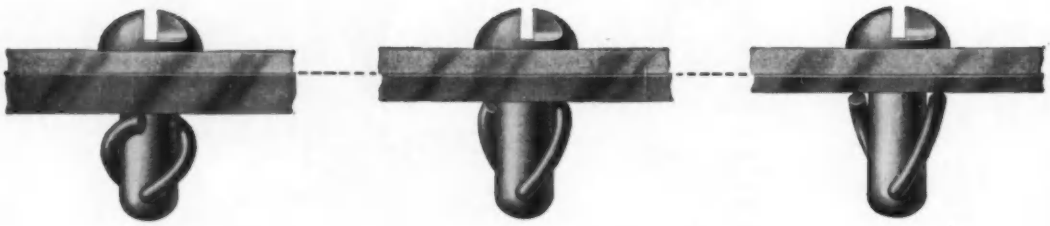
Write for new folder on **"The Importance of Die Set Precision"**

Lists and discusses all critical dimensions . . . shows how and why consistent Die Set precision is vital in every die-making operation. Send for a free copy.

**DANLY MACHINE SPECIALTIES, INC.**

2100 S. Laramie Ave. Chicago 50, Illinois

# This fastener works through thick and thin!



Spring-Lock—the easy-to-use removable fastener for modern designs—works whether panel thicknesses run over or under specifications! Spring wire deflects automatically to handle greater or lesser thicknesses. Spring-Lock's design flexibility makes it more than a fastener: it can be adapted as a shelf support, door strike, knob or any similar panel-mounted device. Many standard shapes and sizes of Simmons Spring-Locks are available from stock.

SIMMONS FASTENER CORPORATION

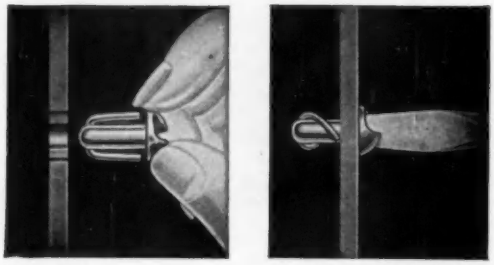
1749 North Broadway, Albany 1, New York

Simmons

QUICK-LOCK
SPRING-LOCK
ROTO-LOCK
LINK-LOCK
DUAL-LOCK

JUST OUT!
NEW 36-PAGE CATALOG WITH APPLICATIONS
SEND FOR IT!

**HERE'S HOW SPRING-LOCK WORKS**



**1.** *Insert fastener.* **2.** *Half-turn locks it in place.*

With production costs on the uptrend, you can figure on Spring-Lock as an assembly time and money-saver, because:

- **Installation is BLIND**
- **Installation is EASY: no special tools are needed**
- **Installation is QUICK: a half-turn locks it in place**
- **Installation is SECURE: the *spring* steel *locks* the fastener, resists vibration**

Send for details and samples, or write us about *your* fastening problem.

# Now! A Complete Line of Self-Locking Microsize UNBRAKO Socket Cap and Set Screws

## Nos. 0, 1, 2 and 3 in alloy steel and stainless steel are available with the Nylok* feature

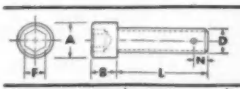
You effect major economies in time and money when you design and assemble small devices with self-locking microsize UNBRAKO socket screws. These close tolerance screws won't work loose. They simplify standardization of small devices where maximum reduction of weight is required without sacrifice of strength. They eliminate the necessity of designing costly special screws to fasten tiny parts in compact assemblies and they prevent the waste of production time while waiting for delivery of special screws.

In addition to having the overall advantages of microsize UNBRAKO socket screws, these screws can be used in holes tapped in soft or die cast materials without stripping threads and ruining expensive work. Also the set screws can be used with hardened shafts, since they lock against the threads of the tapped hole.

All UNBRAKO socket screws can be supplied with the self-locking Nylok feature. The UNBRAKO with Nylok is a single self-locking unit. No auxiliary locking devices are needed. Seated or not, the screw locks positively wherever wrenching stops, won't work loose—because the tough resilient nylon pellet forces mating threads together.

Ask your authorized industrial distributor for details today. He carries complete stocks of self-locking UNBRAKO socket screws (caps and sets from #0 through 1 in., button heads #4 through ⅜ in., flat heads from #4 through ¾ in.). Or write us for literature and samples. Unbrako Socket Screw Division, STANDARD PRESSED STEEL Co., Jenkintown 53, Pa.

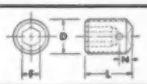
*T.M. Reg. U.S. Pat. Off., The Nylok Corporation




**HEAT-TREATED ALLOY STEEL**
**Self-Locking Microsize UNBRAKO**
**Socket Cap Screws**
Class 3A Threads

| Screw Size | | Threads per in. NC | Threads per in. NF | L Over-all Length | N Pellet Location NC | N Pellet Location NF | Torque Max. prev. on | Torque 1st off stat. min. | Torque 5th off stat. min. |
|---|---|---|---|---|---|---|---|---|---|
| #0 | A .104 | — | 80 | 1/8 | — | .047 | 5.5 | 14.0★ | 7.0★ |
| | B .060 | — | 80 | 3/16 | — | .047 | 5.5 | 14.0★ | 7.0★ |
| | D .060 | — | 80 | 1/4 | — | .047 | 5.5 | 14.0★ | 7.0★ |
| | F .050 | — | 80 | 3/8 | — | .047 | 5.5 | 14.0★ | 7.0★ |
| #1 | A .118 | — | 72 | 1/8 | — | .047 | 11.0 | 28.0★ | 14.0★ |
| | B .073 | — | 72 | 3/16 | — | .047 | 11.0 | 28.0★ | 14.0★ |
| | D .073 | — | 72 | 1/4 | — | .047 | 11.0 | 28.0★ | 14.0★ |
| | F .050 | — | 72 | 3/8 | — | .047 | 11.0 | 28.0★ | 14.0★ |
| #2 | A .140 | 56 | — | 3/16 | .063 | — | 24.0 | 3.0 | 1.5 |
| | B .086 | 56 | — | 1/4 | .063 | — | 24.0 | 3.0 | 1.5 |
| | D .086 | 56 | — | 3/8 | .063 | — | 24.0 | 3.0 | 1.5 |
| | F 1/16 | 56 | — | 1/2 | .063 | — | 24.0 | 3.0 | 1.5 |
| #3 | A .161 | 48 | — | 3/16 | .063 | — | 40.0 | 6.5 | 3.0 |
| | B .099 | 48 | — | 1/4 | .063 | — | 40.0 | 6.5 | 3.0 |
| | D .099 | 48 | — | 3/8 | .063 | — | 40.0 | 6.5 | 3.0 |
| | F 5/64 | 48 | — | 1/2 | .063 | — | 40.0 | 6.5 | 3.0 |

★Measured in in.-gm. (those not marked with a star are measured in in.-oz.)




**HEAT-TREATED ALLOY STEEL**
**Self-Locking Microsize UNBRAKO**
**Socket Set Screws**
Class 3A Threads

| Screw Size | | Threads per in. NC | Threads per in. NF | L Over-all Length | N Pellet Location NC | N Pellet Location NF | Torque Max. prev. on | Torque 1st off stat. min. | Torque 5th off stat. min. |
|---|---|---|---|---|---|---|---|---|---|
| #0 | D .060 | — | 80 | 3/32 | — | .047 | 5.5 | 14.0★ | 7.0★ |
| | F .028 | — | 80 | 1/8 | — | .047 | 5.5 | 14.0★ | 7.0★ |
| | | — | 80 | 5/32 | — | .047 | 5.5 | 14.0★ | 7.0★ |
| | | — | 80 | 3/16 | — | .047 | 5.5 | 14.0★ | 7.0★ |
| | | — | 80 | 1/4 | — | .047 | 5.5 | 14.0★ | 7.0★ |
| #1 | D .073 | — | 72 | 1/8 | — | .062 | 11.0 | 28.0★ | 14.0★ |
| | F .035 | — | 72 | 5/32 | — | .062 | 11.0 | 28.0★ | 14.0★ |
| | | — | 72 | 3/16 | — | .062 | 11.0 | 28.0★ | 14.0★ |
| | | — | 72 | 1/4 | — | .062 | 11.0 | 28.0★ | 14.0★ |
| #2 | D .086 | 56 | — | 1/8 | .062 | — | 24.0 | 3.0 | 1.5 |
| | F .035 | 56 | — | 5/32 | .062 | — | 24.0 | 3.0 | 1.5 |
| | | 56 | — | 3/16 | .062 | — | 24.0 | 3.0 | 1.5 |
| | | 56 | — | 1/4 | .062 | — | 24.0 | 3.0 | 1.5 |
| #3 | D .099 | 48 | — | 5/32 | .093 | — | 40.0 | 6.5 | 3.0 |
| | F .050 | 48 | — | 3/16 | .093 | — | 40.0 | 6.5 | 3.0 |
| | | 48 | — | 1/4 | .093 | — | 40.0 | 6.5 | 3.0 |

★Measured in in.-gm. (those not marked with a star are measured in in.-oz.)

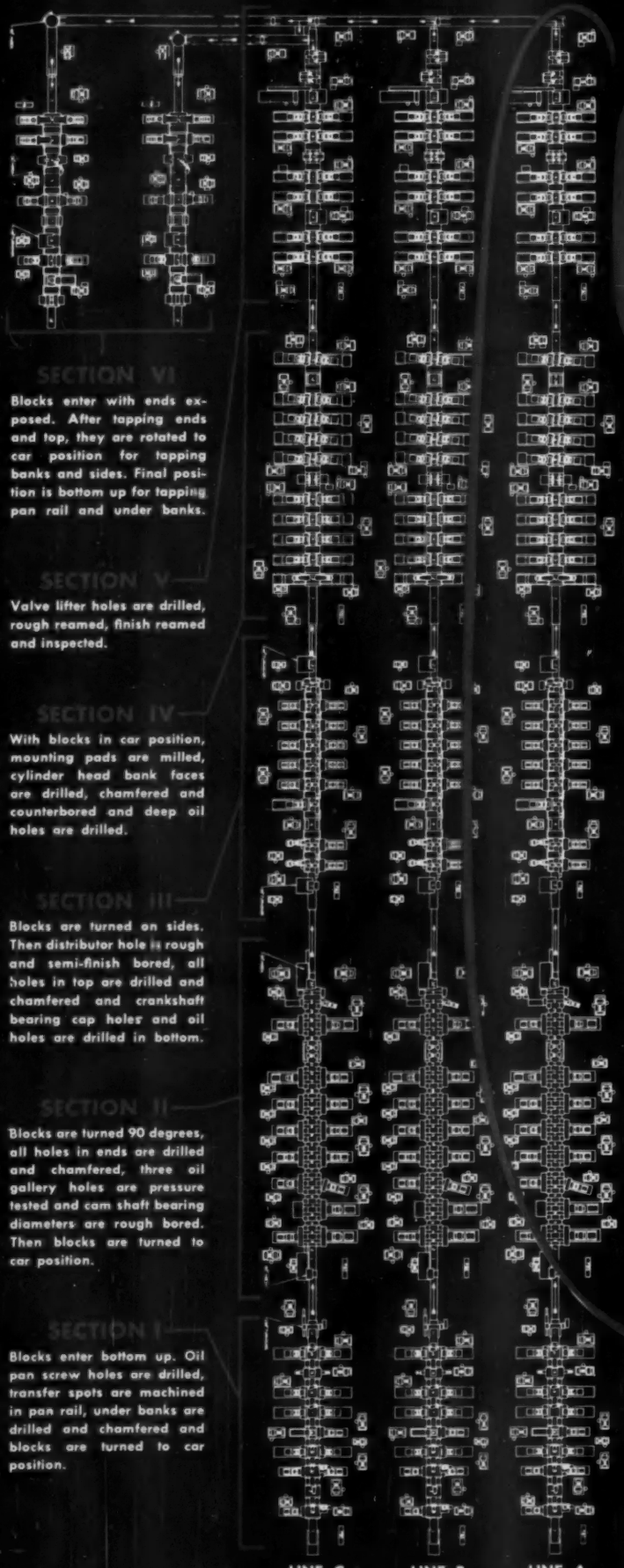
Self-locking microsize UNBRAKO socket cap and set screws are available in sizes #0 through #3, in heat treated alloy steel (plated or unplated) and stainless steel, at your authorized industrial distributor. He also carries a complete stock of other self-locking UNBRAKO socket screws.

*We also manufacture precision titanium fasteners. Write for free booklet.*

SPS **Jenkintown • Pennsylvania**

**Standard Pressed Steel Co.** • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co., Inc. • Cooper Precision Products • Standco Canada Ltd. Unbrako Socket Screw Co., Ltd.

# 1300 ft. Transfer-matic Performs 2291 Operations on V-8 Blocks




**SECTION VI**

Blocks enter with ends exposed. After tapping ends and top, they are rotated to car position for tapping banks and sides. Final position is bottom up for tapping pan rail and under banks.

**SECTION V**

Valve lifter holes are drilled, rough reamed, finish reamed and inspected.

**SECTION IV**

With blocks in car position, mounting pads are milled, cylinder head bank faces are drilled, chamfered and counterbored and deep oil holes are drilled.

**SECTION III**

Blocks are turned on sides. Then distributor hole is rough and semi-finish bored, all holes in top are drilled and chamfered and crankshaft bearing cap holes and oil holes are drilled in bottom.

**SECTION II**

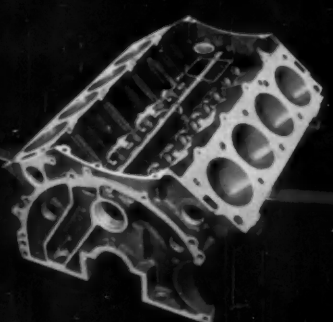
Blocks are turned 90 degrees, all holes in ends are drilled and chamfered, three oil gallery holes are pressure tested and cam shaft bearing diameters are rough bored. Then blocks are turned to car position.

**SECTION I**

Blocks enter bottom up. Oil pan screw holes are drilled, transfer spots are machined in pan rail, under banks are drilled and chamfered and blocks are turned to car position.

Here is the answer to the automobile industry's insistent request for machine tools which will reduce the cost of model changes and shorten change-over periods. This giant "Sectionized" Transfer-matic is constructed with an entirely new set of Cross building blocks and applies new concepts of standardization to machine bases, transfers, fixtures and heads.

- ★ Capacity to machine any passenger car engine block.
- ★ 270 stations in 17 sections, each with independent controls; sections operate automatically as blocks are made available; any section may be stopped without interrupting production of others.
- ★ 2291 operations on 185 blocks simultaneously.
- ★ Rated capacity of 350 cylinder blocks per hour.
- ★ Cross Machine Control Units with Toolometers for efficient tool programming.
- ★ Pre-set tools to reduce downtime.



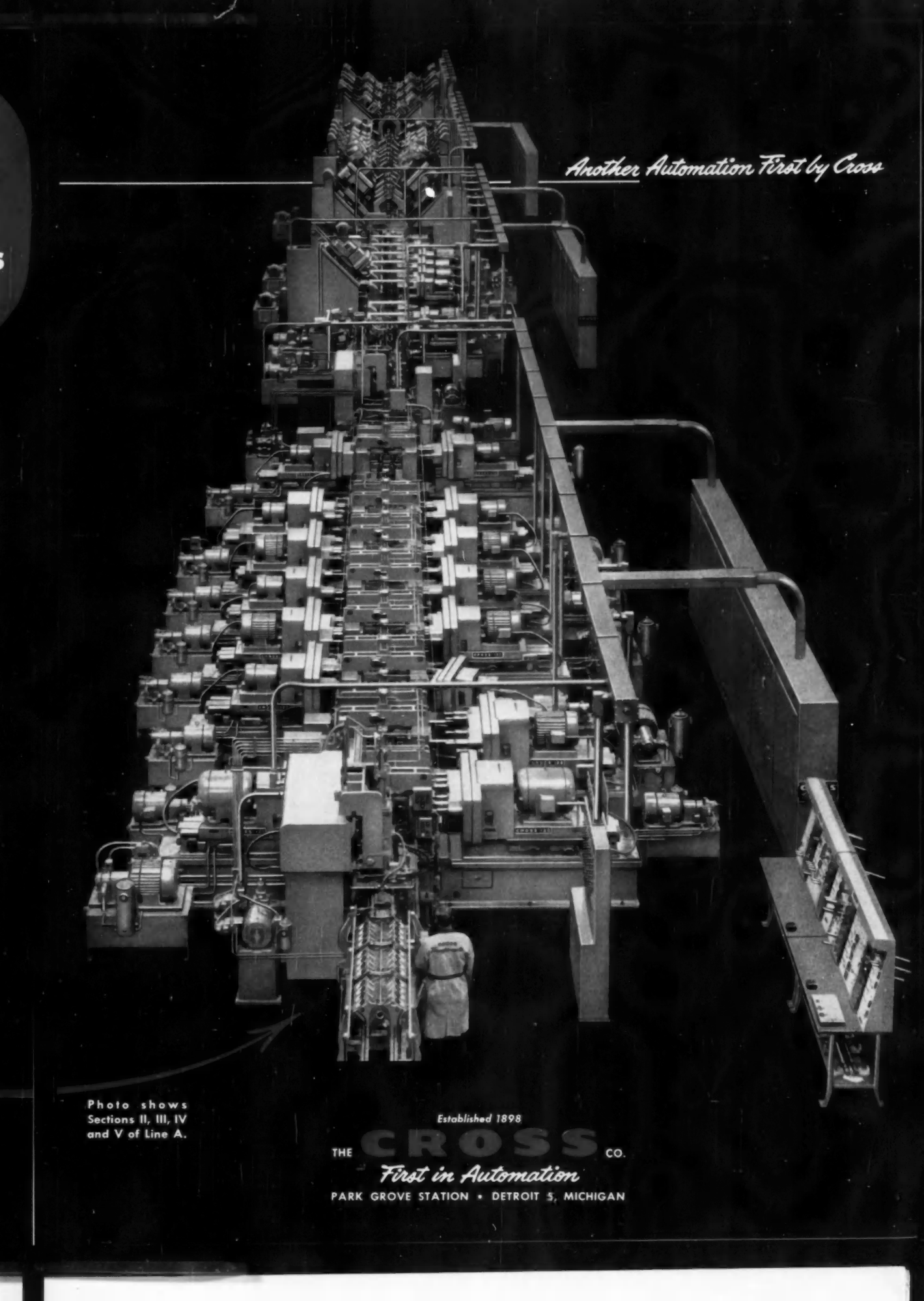



Photo shows
Sections II, III, IV
and V of Line A.

*Established 1898*

THE CROSS CO.

*First in Automation*

PARK GROVE STATION • DETROIT 5, MICHIGAN

# How new cushioning medium makes

Don't this deep piping an expensive hand operation?

NO. It's Airfoam, molded all-one-piece — fewer operations than ever.

How does one join this headrest, back and arm cushioning?

ONE DOESN'T. With Airfoam, they can be a single, simple, wrap-around unit.

How long can this outside bolster keep its shape?

FOR THE LIFE OF THE CAR. It's permanently molded Airfoam.

This swivel base is fine — but where does one put the mechanism?

WHERE IT BELONGS. Molded Airfoam seat cushions take far less depth than the conventional springs and padding.

# dream seats practical

## —and creates new R-O-O-M, new comfort, new appeal!

LIMITED INTERIOR SPACE needn't limit your creative thinking about seating.

That is—if you make the most of the wonderful new *freedom of design* offered by full-depth AIRFOAM.

For full-depth AIRFOAM is so much *more* than an unusually comfortable cushioning alternate!

Molded to your specifications, AIRFOAM is a completely different, astoundingly versatile cushioning *medium* that eliminates bulky components. It allows you to do things not possible with conventional methods. New things—inspiring things—sales-minded things—and because of the unique advantages of AIRFOAM, forever *practical!*

Some of the best names in the industry have repeatedly broadened their scope by consulting AIRFOAM Development Engineers. Perhaps we can answer some key questions for you. Goodyear, Automotive Products Dept., Akron 16, Ohio.

**CROSS SECTION COMPARES OLD AND NEW SEAT CONSTRUCTION:**

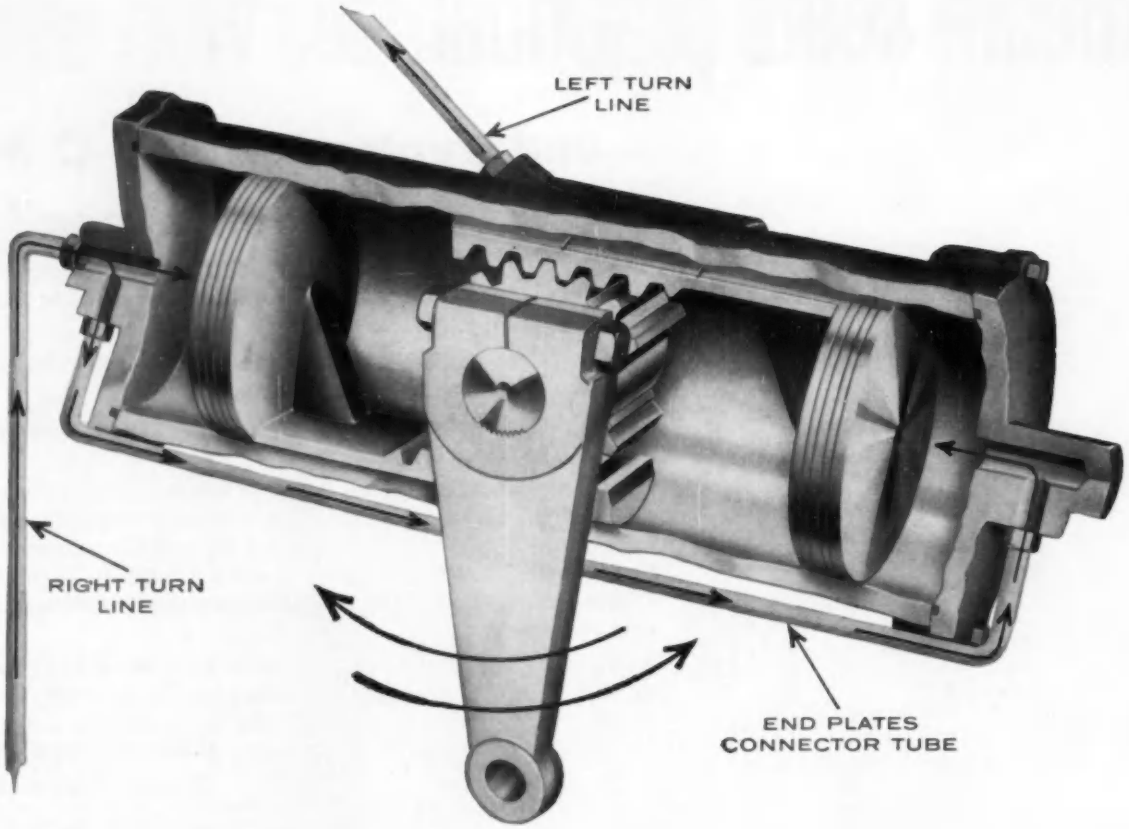
*Solid areas show space saved by full-volume* AIRFOAM *seat-units.*

Airfoam

MADE ONLY BY GOODYEAR

THE WORLD'S FINEST, MOST MODERN CUSHIONING

Airfoam—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio




# Now...a new kind of Power Cylinder to help you cut costs

THE new rotary motion Thompson Power Cylinder provides versatility of application, ease of installation, compactness and efficiency certain to solve many design and manufacturing problems. These features can cut your costs by simplifying production. It is now in use in a leading make of heavy-duty trucks.

Requiring a minimum of space, the Thompson Power Cylinder can be operated wherever hydraulic or pneumatic pressure is available. Operating from 600-1000 psi, at 700 psi it delivers approximately 26,000 inch pounds torque output. These parameters can be varied to obtain a custom installation. Also, over-running clutches, sprockets, gears, chains, etc., are easily adapted to the output shaft to further increase its versatility.

Precision engineered, the Thompson Power Cylinder is as dependable as it is versatile. You can count on a long, continuous, trouble-free life.

To learn more how the Thompson Power Cylinder can save you money in design, manufacture and installation costs, write for our free booklet. Described are many of its diverse uses and additional benefits. Mail to Thompson Products, Inc., Michigan Division, 34201 Van Dyke Avenue, Warren, Michigan.

**You can count on**

**Thompson Products**

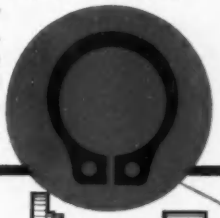
**Michigan Division:**

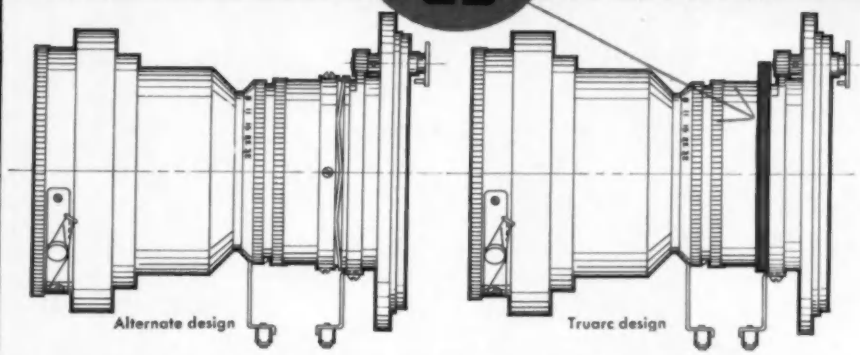
**Warren and Portland**

# Waldes Truarc Retaining Ring eliminates 7 parts, saves $8.88 in sub-assembly of aerial reconnaissance camera

**Gordon Enterprises,** No. Hollywood, California, saved the Navy almost 1½ million dollars on 500 cameras. Gordon rebuilt new, efficient "CA" series out of Navy-owned obsolete models. Critical parts are now held together by Waldes Truarc Retaining Rings.

Truarc Rings are trouble-free, will not change position during operation. Accuracy is limited only by groove and ring dimension tolerances. And standardized Truarc Rings are quickly interchangeable in overhaul which now takes only 11 minutes, can be handled by unskilled technicians.






**Truarc 5100-287** ring retains shutter speed adjustment mechanism on the Lens Adapter Plate Assembly which mounts and locks the lens and shutter assemblies accurately to camera body. Alternate design required retaining washer, spring, collar and 4 locking screws.

**Weight Saving: 7.25 oz.**

**Assembly Time Saving: . . . . . 6½ min.**

**DOLLAR SAVINGS:**

| | |
|---|---|
| **Material** | **$ .93** |
| **Fabrication** | **6.88** |
| **Inspection** | **1.07** |
| **Total** | **$8.88** |

Whatever you make, there's a Waldes Truarc Ring designed to save you material, machining and labor costs, and to improve the functioning of your product.

In Truarc, you get

**Complete Selection:** 36 functionally different types. As many as 97 standard sizes within a ring type. 5 metal specifications and 14 different finishes. All types available quickly from leading OEM distributors in 90 stocking points throughout the U. S. and Canada.

**Controlled Quality** from engineering and raw materials through to the finished product. Every step in manufacture watched and checked in Waldes' own modern plant.

**Field Engineering Service:** More than 30 engineering-minded factory representatives and 700 field men are at your call.

**Design and Engineering Service** not only helps you select the proper type of ring for your purpose, but also helps you use it most efficiently. Send us your blueprints today...let our Truarc engineers help you solve design, assembly and production problems...without obligation.

For precision internal grooving and undercutting . . . Waldes Truarc Grooving Tool!

**WALDES**

# TRUARC®

**RETAINING RINGS**

**WALDES KOHINOOR, INC.**
**47-16 AUSTEL PLACE, L. I. C. 1, N. Y.**

**Waldes Kohinoor, Inc., 47-16 Austel Place, L. I. C. 1, N. Y.**
Please send new, descriptive catalog showing all types of Truarc rings and representative case history applications. *(Please print)*

*Name* .....
*Title* .....
*Company* .....
*Business Address* .....
*City* ..... *Zone* *State* .....

AY109

WALDES TRUARC Retaining Rings, Grooving Tools, Pliers, Applicators and Dispensers are protected by one or more of the following U. S. Patents: 2,382,948; 2,411,426; 2,411,761; 2,416,852; 2,420,921; 2,428,341; 2,439,785; 2,441,846; 2,455,165; 2,483,379; 2,483,380; 2,483,383; 2,487,802; 2,487,803; 2,491,306; 2,491,310; 2,509,081; 2,544,631; 2,546,616; 2,547,263; 2,558,704; 2,574,034; 2,577,319; 2,595,787, and other U. S. Patents pending. Equal patent protection established in foreign countries.

# Automatic heat-cycle control protects aircraft engine stamina

Fast, accurate response to temperature or atmosphere change is a vital must in furnace performance at Kelsey-Hayes Company. Precise hardness and shock resistance of aircraft engine parts result from these qualities in two Westinghouse pit furnace and Ammogas® generator installations.

"These Westinghouse pit furnaces are fully automatic," reports the owner. Once the operator sets temperature and atmosphere for each batch, the furnaces maintain temperature control to plus or minus 10°F. For nitriding, a consistently high quality Ammogas atmosphere is supplied each furnace by the 150 cu. ft./hour generator. Varying the atmosphere composition permits bright annealing in the same furnace.

Rigid product specifications are easily met when Westinghouse engineers electric heating equipment. Furnace and atmosphere generators are integrated and test-proven to meet production and metallurgical needs. It's another good reason to talk over your next metal heating problem with the local Westinghouse industrial heating sales engineer, or write Westinghouse Electric Corporation, Industrial Heating Division, Meadville, Pa.

J-10468

NEW — Westinghouse 20-page book on Metals Heating . . . Gas, Electric and Induction. Write for your copy to Westinghouse Electric Corporation, 3 Gateway Center, Box 868, Pittsburgh 30, Penna.

YOU CAN BE SURE...IF IT'S Westinghouse

**Operating flexibility.** Furnaces and Ammogas atmosphere generator handle a wide variety of heating cycle combinations for over fifty different aircraft engine parts. Once heating cycle starts, automatic control takes over.

**Single operator economy.** One operator easily handles all three Westinghouse electric pit furnaces. They are compact and dependable, providing 15% saving in space and 25% less maintenance than other furnace types.

# HEAVY-DUTY

## Heavy-Duty Mine Service Requires MECHANICS Quality

In cramped quarters — where starts, stops and reverses are frequent — loads heavy and torque requirements severe — amid dust and moisture — MECHANICS Close-Coupled, Roller Bearing UNIVERSAL JOINTS serve dependably, safely and economically.

They perform equally well in other rugged machines where joint space is limited and angles are extreme. Let MECHANICS engineers help with *your* joint problems.

**MECHANICS UNIVERSAL JOINT DIVISION**
**Borg-Warner • 2024 Harrison Ave., Rockford, Ill.**
Export Sales: Borg-Warner International
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# MECHANICS

*Roller Bearing* B-W

# UNIVERSAL JOINTS

For Cars • Trucks • Tractors • Farm Implements • Road Machinery • Aircraft • Tanks • Busses and Industrial Equipment

# For high-integrity fluid lines specify R/M FLEXIBLE THIN-WALL Teflon* HOSE

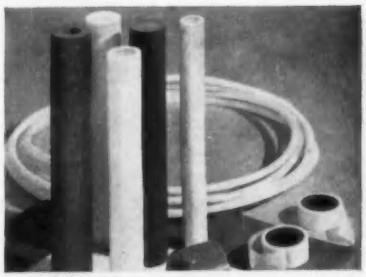
You can depend on R/M Flexible Thin-Wall "Teflon" Hose to withstand corrosive fluids, high mechanical stresses, and extreme ambient temperatures. In every application, it means an extra measure of safety and performance.

R/M's new hose — stainless steel wire-braided or rubber-covered — is extremely flexible and does not expand, contract or fatigue. It can be kept in continuous service at temperatures from −100° to +400°F, and is chemically inert to hydraulic fluids and synthetic lubricants. Also it has a very low coefficient of friction, reducing pressure drop in fluid systems to a minimum.

R/M Flexible Thin-Wall "Teflon" Hose is one of a large family of products developed by R/M engineers to take advantage of the unique properties of this material. Our long experience with "Teflon" is your best assurance of the highest quality.

This hose is available through leading coupling manufacturers. A list of suppliers and complete specifications will be furnished on request.

*A Du Pont trademark



Other R/M "Teflon" products for the automotive and aviation industries include rods, sheets, tubes and tape; centerless ground rods held to very close tolerances; stress-relieved molded rods and tubes; Raylon — a mechanical grade of "Teflon" having many of the properties of virgin "Teflon." For details, call or write R/M.

R/M

## RAYBESTOS-MANHATTAN, INC.

### PLASTIC PRODUCTS DIVISION, MANHEIM, PA.

**FACTORIES:** Manheim, Pa.; Paramount, Calif.; Bridgeport, Conn.; No. Charleston, S.C.; Passaic, N.J.; Neenah, Wis.; Crawfordsville, Ind.; Peterborough, Ontario, Canada

RAYBESTOS-MANHATTAN, INC., Engineered Plastics • Asbestos Textiles • Mechanical Packings • Industrial Rubber • Sintered Metal Products • Rubber Covered Equipment Abrasive and Diamond Wheels • Brake Linings • Brake Blocks • Clutch Facings • Laundry Pads and Covers • Industrial Adhesives • Bowling Balls

A
B
C
D
E
F
G
H
NIAGARA
NIAGARA
a

from Niagara comes...

- **A** **POWER OPERATED BARREL TYPE SLIDE ADJUSTMENT** facilitates and speeds die-setting. Push button operated, it's not only fast and smooth but permits micro-positioning within a thousandth of an inch.
- **B** **HYDRAULIC INCLINING DEVICE** operates smoothly. The press can be inclined or brought upright in approximately 2 minutes. Operating lever and push buttons conveniently located on left panel leg.
- **C** **BRAIN CENTER OF THE AUTOMATION SYSTEM,** the Rotary Limit Switch can be adjusted precisely while the press is in motion for synchronizing automation devices with press cycle.
- **D** **LOW INERTIA, ELECTRO-PNEUMATIC FRICTION CLUTCH** operates directly on the crankshaft. Most of its weight continues to rotate with the main gear. Only the crankshaft and driving plate are started and stopped at each cycle. Heat and wear are reduced to an absolute minimum. Torque capacity may be changed by adjusting air pressure.

# truly revolutionary line of OBI's

## automated to hit new production highs

Never before has there been an OBI like this. In feature after feature, you'll see pulse-quickening newness that will inject speed and rhythm into your production. Outfitted with today's most advanced controls and devices, this all-new Niagara Series EA offers you automation at its very best.

Boasting a revolutionary front-to-back crankshaft design, it's streamlined in an ultra-modern, functionally sound, eye-pleasing way. In fact, it's the only totally-enclosed OBI ever made. There are no exposed, overhanging gears, flywheel or other mechanisms. With the entire driving assembly fully enclosed within the limits of the compact frame, this trim-line performer actually takes up less floor space than any press in its range and category. It's only natural that such a triumphant line of OBI's as this should parade from Niagara . . . for Niagara has been leading the way, *all of the way,* in building all types of OBI's — single crank and double crank, standard and fully automatic. Hailed as "the latest and greatest of them all," the Series EA is built in 4 sizes, with shaft diameters from 4½ to 7½ inches and capacities from 75 to 200 tons.

**FULL DETAILS ARE YOURS FOR THE ASKING:**
Write for illustrated Bulletin 56 today!

NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, N. Y.

DISTRICT OFFICES

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Distributors in principal U. S. cities and major foreign countries

- **E** **AIR CONTROL PANEL AND HYDRAULIC INCLINING SYSTEM** are neatly housed within the left leg. Air line filter, pressure regulator, gages, blow-off valves and lubricators, as well as the hydraulic pump for the inclining system, are all concealed behind a dust-tight door.
- **F** **AUTOMATIC CIRCULATING OIL SYSTEM** (left panel leg) sends metered flow of clean, filtered oil to all bearings and gears in the crown, air counterbalance and slide gibs. Correct operating oil pressure is maintained or the press stops automatically.
- **G** **CONTROLLED AIR SUPPLY AND PNEUMATIC TIMING RELAYS** (left panel leg): Air line receptacles, synchronized with press cycle, are provided for die doper, die kicker and die lifter . . . with auxiliary receptacles for die maintenance tools. Adjustable timing relays control interval of automation functions initiated by rotary limit switch.
- **H** **OPERATOR'S PANEL** (right panel leg) features deluxe operating controls conveniently arranged for fingertip direction of every press motion. Chained to safety block, safety plug de-energizes entire press control when pulled from its receptacle.
- **I** **COMBINATION MOTOR AND PRESS CONTROL PANEL** fully enclosed within the right leg behind a flush-mounted, dust-and-oil-tight door, houses: disconnect switches, circuit protection, transformers, fuses for main motor and auxiliary power supply; control relays; starters for main motor, lubrication and hydraulic pumps.

**PNEUMATIC CUSHION** is automatically lubricated by self-contained pumping system; internally guided and rigidly supported by press frame.

# NIAGARA

## front-to-back crankshaft AUTOMATED INCLINABLES

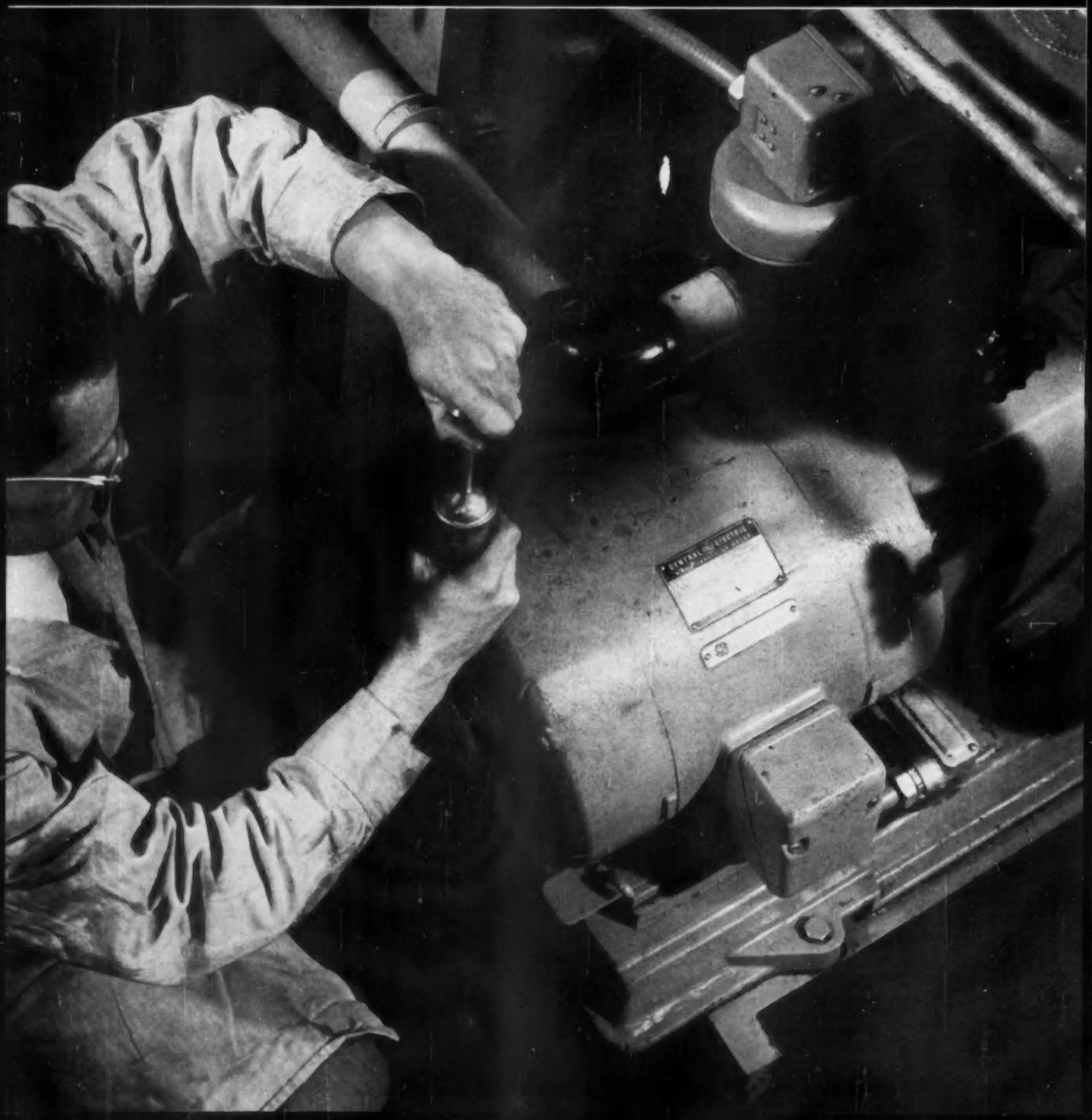
**America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work**

compact . . . power-packed

## New General Electric

# NOW EASIER

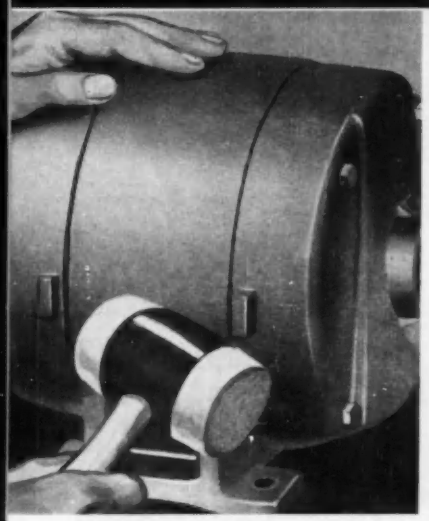
## COMPLETE LINE AVAILABLE



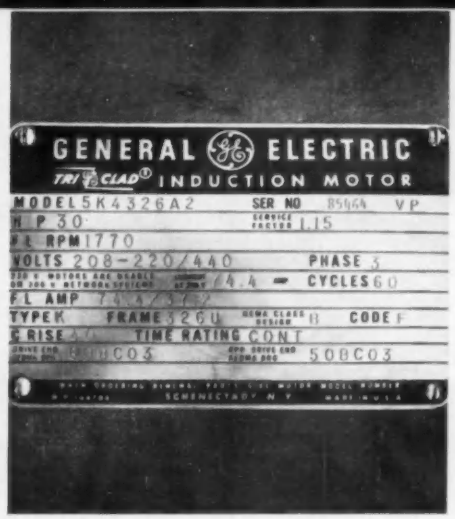
TRI 55 CLAD Motors are . . .

# TO MAINTAIN

## THROUGH 125-HORSEPOWER



**FAST END-SHIELD REMOVAL** is possible because of Tri-Clad '55' motor's rugged knock-off lugs. Remove four bolts, tap on knock-off lugs and end-shield is off to permit easy repositioning or quick motor inspection.




**EASIER TO MAINTAIN,** Tri-Clad '55' motors utilize a stainless-steel, non-corrosive nameplate to give complete rating information including AFMBA bearing numbers. Separate steel plate gives connection diagrams.

**EASIER TO INSTALL,** Tri-Clad '55' motors use Perma-numbered leads to simplify wiring, speed motor hook-up. Numbers are stamped on terminals and printed on every half-inch of Geoprene® leads.

## immediate shipment . . . all ratings

The need for faster production schedules and reduced production costs has made motor maintenance of prime concern to motor users. Modern motors must be easy to inspect and maintain without loss of production time due to routine maintenance.

**TO MEET THIS NEED,** G-E Tri-Clad '55' motors feature an oversize grease reservoir which contains enough grease for normal 5-year operation. Yet, new grease can be added while the motor is running. Other easy maintenance features are described above.

**EASE OF MAINTENANCE,** however, is not the whole Tri-Clad '55' motor story. Experienced G-E motor engineers have used revolutionary materials and the most modern production and testing facilities to provide a motor that is not only easier to maintain, but also more reliable and easier to install.

Formerly available only to 30-hp, these proven Tri-Clad '55' motors are now available for immediate shipment—usually from nearby warehouse stocks—up through 125-hp.

**FOR FULL INFORMATION** on the complete Tri-Clad '55' motor line contact your nearest G-E Apparatus Sales Office or Distributor.

Section C891-7
**GENERAL ELECTRIC COMPANY**
Schenectady 5, New York

Please send me the following publications:

☐ **FREE BULLETIN (GEA-6602) describes advanced features of new Tri-Clad '55' motors through 125-hp.**

☐ **FREE SLIDE RULE (GEN-148) to determine weight and space-saving benefits of new Tri-Clad '55' motors.**

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**ADDRESS** _____

**CITY & STATE** _____

*Progress Is Our Most Important Product*

**GENERAL ELECTRIC**

# There is NO SUBSTITUTE for a forging: NO SUBSTITUTE for Wyman-Gordon Experience

There is more to the superiority of the forged crankshaft than just strength.

No other method of fabrication can compare with the forging process for dependability. The uniformity and predictability of physical properties with minimum variance from piece to piece or from one location to another in the same piece is assured to the greatest degree by modern forging practice.

Top automotive engineers agree that the use of a forged crankshaft permits the design of a more compact engine which is a decided advantage when thinking in terms of limited space available and overall engine weight reduction.

As compression ratios increase and engine outputs go up the risk factor must be reduced. Again, the uniformity of quality in the backbone of the engine, the crankshaft, is most essential and made possible only by a forging.

There is NO SUBSTITUTE for a forging and in a forging there is NO SUBSTITUTE for WYMAN-GORDON quality and experience.

## WYMAN-GORDON COMPANY

*Established 1883*

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER 1, MASSACHUSETTS

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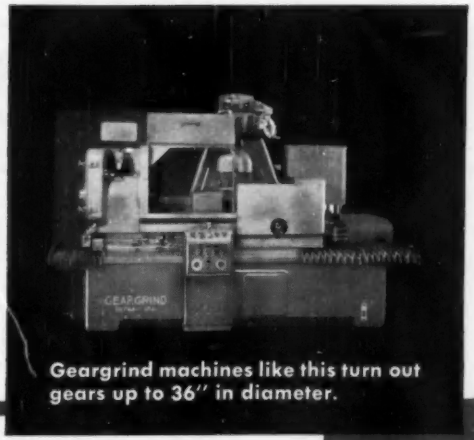


Geargrind machines like this turn out gears up to 36" in diameter.

# 4-WAY *Versatility*

**TO FINISH GRIND GEARS, SPLINES AND SPECIAL CONTOUR PARTS TO YOUR REQUIRED TOLERANCES**

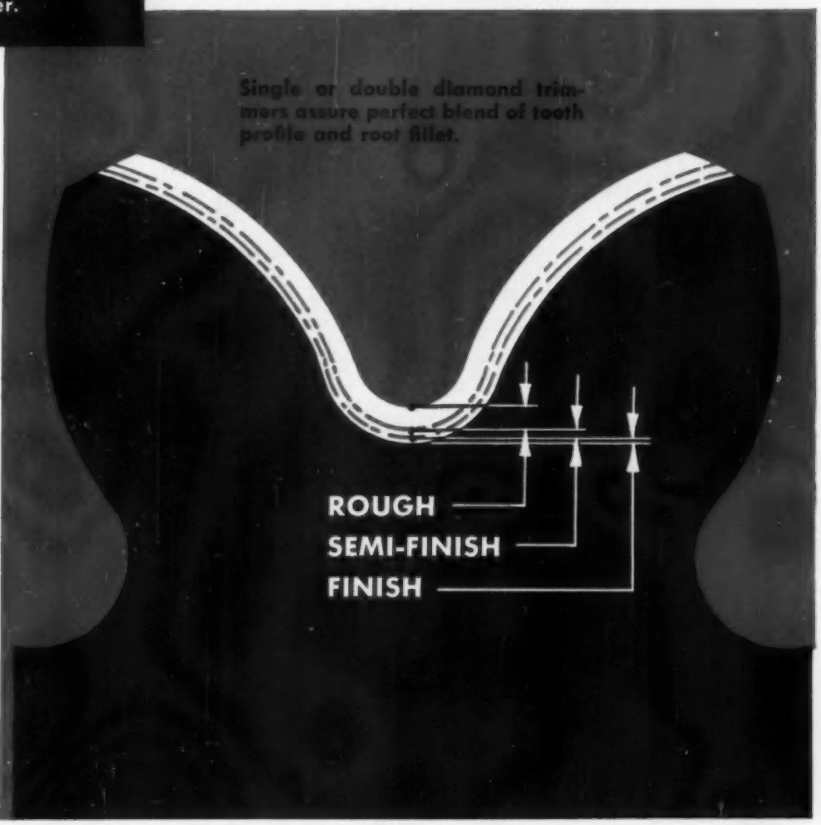
**1**
**ROUGHING GRIND**

**2**
**ROUGH GRIND**
**FINISH GRIND**

**3**
**ROUGH GRIND**
**SEMI-FINISH GRIND**
**FINISH GRIND**

**4**
**MANUAL GRIND**

**Choose from any of the above four methods (with selective feed increments) depending on your requirements.**




57MT-A

Besides the exceptional versatility illustrated above, Geargrind machines deliver high productivity and accuracy. Over 10 years ago, design engineers at Geargrind tackled the job of building a machine to grind gear teeth to the finest quality at the highest possible production rate. Finished product of this effort is today's Geargrind machine. Geargrind machines now offer outstanding performance in all types of aircraft, automotive and industrial applications.

**ALL GEARGRIND MACHINES:**

- Perform operations never before possible
- Save valuable time
- Decrease the need for skilled operators
- Increase production rates
- Offer unmatched combination of features

**WRITE FOR LITERATURE**

The entire Geargrind story is covered in this illustrated brochure. Send today for your free copy.

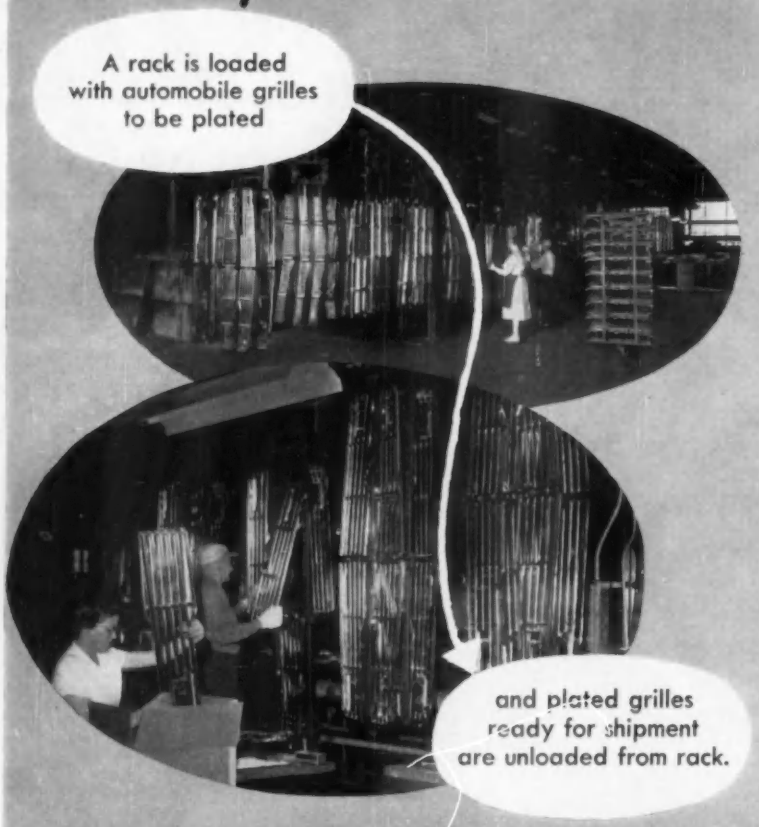
GEARGRIND Detroit

**THE GEAR GRINDING MACHINE COMPANY**

**3903 Christopher, Detroit 11, Michigan**

MANUFACTURERS OF: THE DETROIT SCREWMATIC 750, AUTOMATIC SCREW MACHINE RZEPPA ("SHEPPA") CONSTANT VELOCITY UNIVERSAL JOINTS

# Every 57 Seconds




**The Udylite Plating Machine at the Jackson, Michigan plant of Ryerson & Haynes, Inc., is fully automatic with automatic rack handling as an integral part of the machine.**

**The racks, loaded with grilles to be plated, automatically move from the plant conveyor to the Udylite machine to start the twenty step cycle of precision nickel and chrome plating.**

**Then, after the processing cycle is completed, racks of plated grilles move automatically from the Udylite Plating Machine onto the plant conveyor and into the packaging and shipping department.**

**With automatic rack handling, chance of damage and human error are reduced to a seemingly impossible minimum. This is particularly important after nickel-chrome plating, when the grilles carry an investment of plating time and materials.**

**Ryerson & Haynes, Inc. have enjoyed the benefits of this Udylite machine since January of 1955. Production has been constant, two or three shifts a day, five to seven days a week.**

**You, too, can lower and reduce rejects with Udylite production plating and automatic handling equipment. Write us today.**

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

WORLD'S LARGEST PLATING SUPPLIER


# CALENDAR
## OF COMING SHOWS AND MEETINGS

National Electronics Conference, Hotel Sherman, Chicago, Ill. Oct. 7-9

ASLE-ASME Lubrication Conference, Royal York Hotel, Toronto, Ont., Canada ..... Oct. 7-9

American Institute of Electrical Engineers, fall general meeting, Morrison Hotel, Chicago, Ill. Oct. 7-11

Gray Iron Founders' Society, annual meeting, Drake Hotel, Chicago, Ill. ..... Oct. 9-11

ASME - AIME Fuels Conference, Chateau Frontenac, Quebec, Canada ..... Oct. 10-12

Pressed Metal Institute, annual meeting, Castle Harbor, Bermuda ..... Oct. 13-17

AIEE Feedback Control Conference, Chalfonte - Haddon Hall, Atlantic City ..... Oct. 16-18

International Motor Show, Earls Court, London, England ... Oct. 16-26

National Conference on Industrial Hydraulics, Hotel Sherman, Chicago, Ill. ..... Oct. 17-18

Magnesium Association, 13th annual meeting, Biltmore Hotel, New York, N. Y. ..... Oct. 17-18

American Society of Industrial Designers, annual convention, Ojai Valley Inn, Ojai, Calif. Oct. 17-20

ASME Power Conference, Americus Hotel, Allentown, Pa... Oct. 21-23

National Safety Congress and Exposition, 45th annual meeting, Hotel Conrad Hilton, Chicago, Ill. ..... Oct. 21-25

Computer Application Symposium, Hotel Sherman, Chicago, Ill. Oct. 23-24

National Machine Tool Builders' Association, annual meeting, French Lick - Sheraton Hotel, French Lick, Ind. ..... Oct. 23-25

American Society of Body Engineers, annual technical convention, Rackham Bldg., Detroit, Mich. ..... Oct. 23-25

American Gear Manufacturers Association, semi-annual meeting, Edgewater Beach Hotel, Chicago, Ill. ..... Oct. 28-30

National Lubricating Grease Institute, annual meeting, Edgewater Beach Hotel, Chicago, Ill. Oct. 28-30

National Industrial Packaging & Handling Exposition, Convention Hall, Atlantic City, N. J. Oct. 28-31

International Motor Show, Turin, Italy ..... Oct. 30-Nov. 10

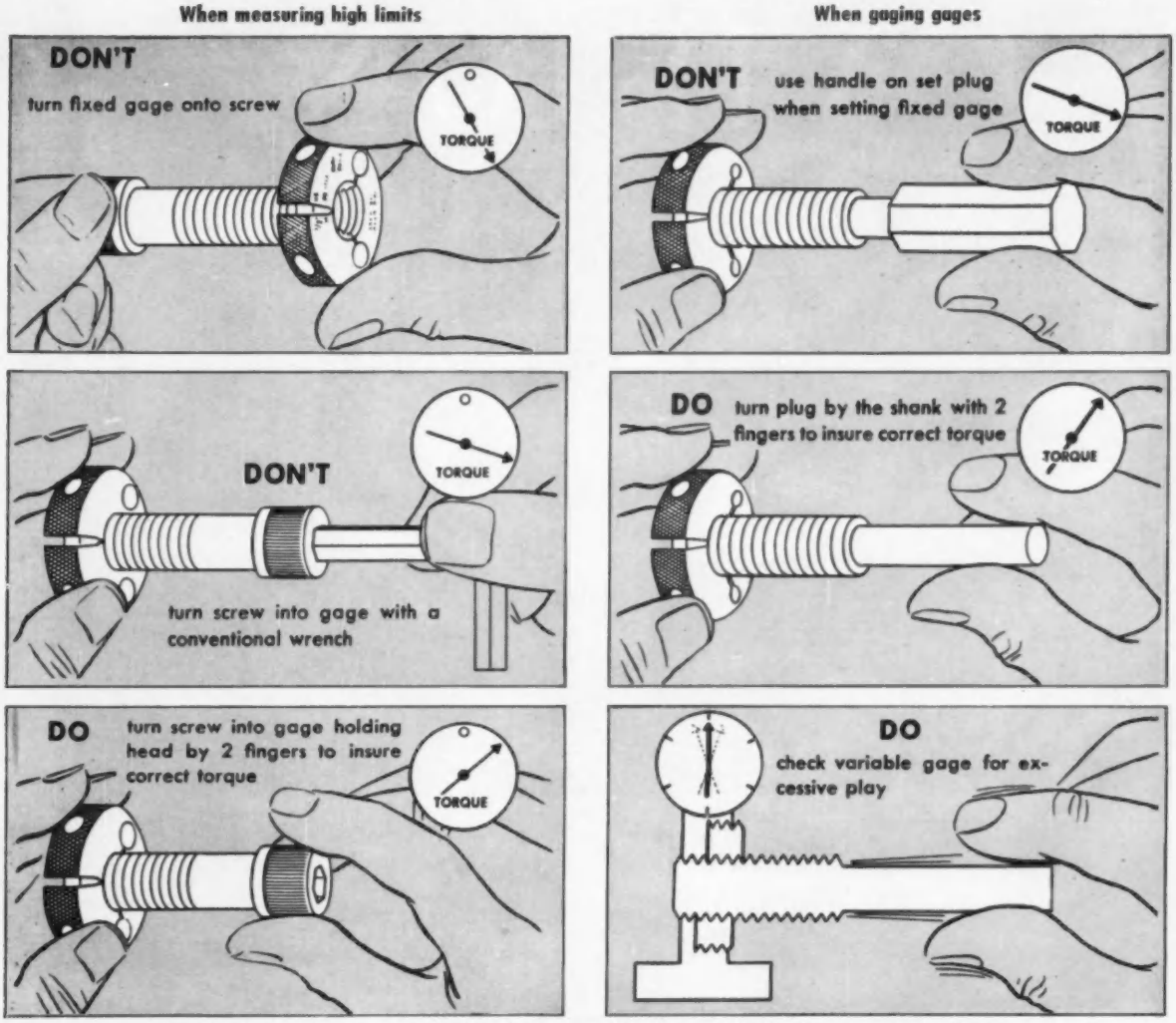
National Metals Exposition and Congress and Second World Metallurgical Congress, International Amphitheatre, Chicago, Ill. ..... Nov. 2-8

SAE Transportation Meeting, Hotel Statler, Cleveland, O. ..... Nov. 4-6

American Institute of Electrical Engineers, ninth annual Machine Tool Conference, Hotel Schroeder, Milwaukee, Wisc. ..... Nov. 4-6

SAE Diesel Engine Meeting, Hotel Statler, Cleveland, O. ..... Nov. 5-6

SAE Fuels and Lubricants Meeting, Hotel Statler, Cleveland, O... Nov. 7-8



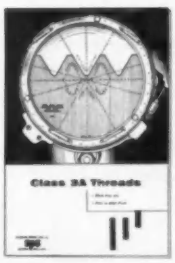

These illustrations from new SPS booklet show some of the do's and don'ts of gaging precision threads.

# 3A threads: what they are; how to gage them — new SPS booklet tells all

Threads made to Class 3A fit are the most precise in general use in industry. But you do not always get the 3A precision you specify. Because of many different gaging techniques that yield varying results, screws with threads well outside the Class 3A tolerance limits often pass inspection.

SPS has prepared a new booklet on this subject. It explains clearly what Class 3A threads are and the pros and cons involved in the widely varying gaging techniques in use today. It reviews the gaging of high and low limits of 3A threads, sampling techniques, and even the methods of gaging gages.

All standard UNBRAKO socket screw products fall within specified tolerance limits *no matter what method is used to gage them.* Leading industrial distributors carry complete stocks. Unbrako Socket Screw Division, STANDARD PRESSED STEEL Co., Jenkintown 53, Pa.




*We also manufacture precision titanium fasteners. Write for free booklet.*

*Form 2239, "Class 3A Threads: what they are; how to gage them." 16 pages, with many illustrations. Write for free copy today.*

**STANDARD PRESSED STEEL CO.**

UNBRAKO® **SOCKET SCREW DIVISION** SPS

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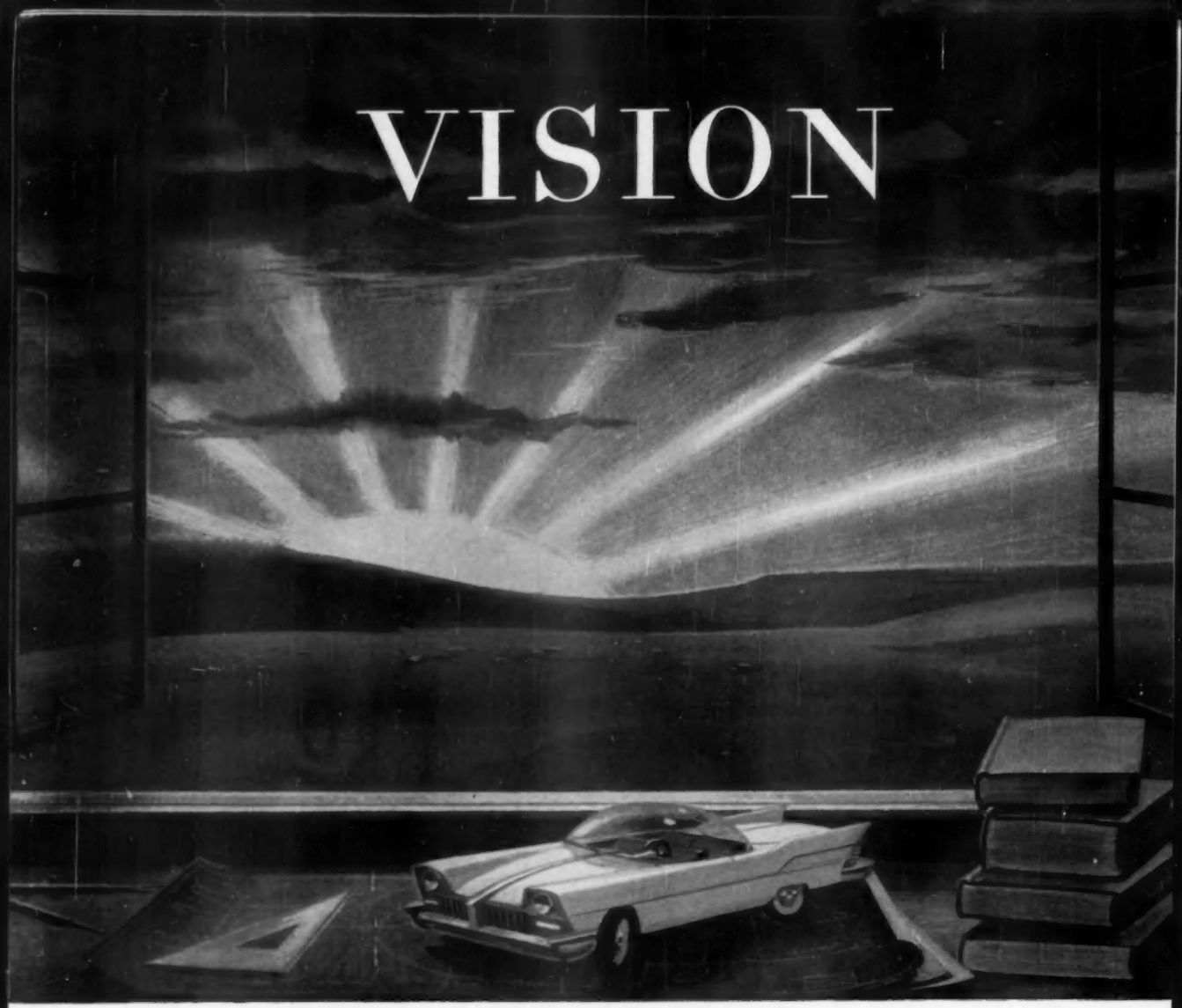


# LOOKING TO THE FUTURE—PRODUCING FOR TODAY!

Progress has been the keynote of the automotive industry. Today's achievements are but challenges for the accomplishments of tomorrow.

Over the years Bendix Products Division has contributed significantly to automotive progress. From four wheel brakes to power braking and power steering, Bendix has pioneered and developed many of the industry's most notable advancements.

And today Bendix Products Division is planning new and better products for the cars and trucks of tomorrow.

That's why the industry looks to Bendix* as a source of new ideas, as well as a volume manufacturer of automotive components.

*REG. U.S. PAT. OFF.

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# High Spots of This Issue

### ▼ Timken Automatic Plant

The new Bucyrus plant of Timken Roller Bearing Co. is for all practical purposes a completely automatic factory. In this guided plant tour the reader is shown the entire production setup, which has a current annual capacity of 33 million cups and 27 million cones. Page 48.

### ▼ Farnborough Air Show Reveals Missiles and Rockets

The 18th Farnborough Air Show, staged early in September, reflected the recent shift in Britain's defense policy from piloted to guided weapons. This survey of the show's highlights places special emphasis on the latest British guided missiles and rocket engines. Page 56.

### ▼ Martin Evaporative Cooling System

This article discusses an airborne evaporative cooling system designed to protect electronic equipment inside aircraft or missiles at temperatures of 800 F of Mach 5 flight. Developed by Martin Co., the system is still under test and continued development work. Page 61.

### ▼ New Clutch Designs Must Pass Severe Tests

Lipe-Rollway Corp., manufacturer of heavy-duty clutches, has established a unique laboratory department, where all new products are assembled, and then tested to assure that they will perform according to specifications. The testing process is covered here in detail. Page 64.

### ▼ Electric Window Regulators Assembled in Hydraulic Presses

Electric window regulators for car windows produced by Huppower Div. of Hupp Corp. include a motor-driven worm and gear in an aluminum die casting having a stamped steel cover. A step-by-step description of the methods of assembling these components is given here. Page 70.

### ▼ 35 New Product Items And Other High Spots, Such As:

Standardized military engines; SAE Meeting; dual-drive tandem for medium and heavy-duty trucks; report from farm equipment industry; Pneuride air suspension system; and industry statistics.

AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
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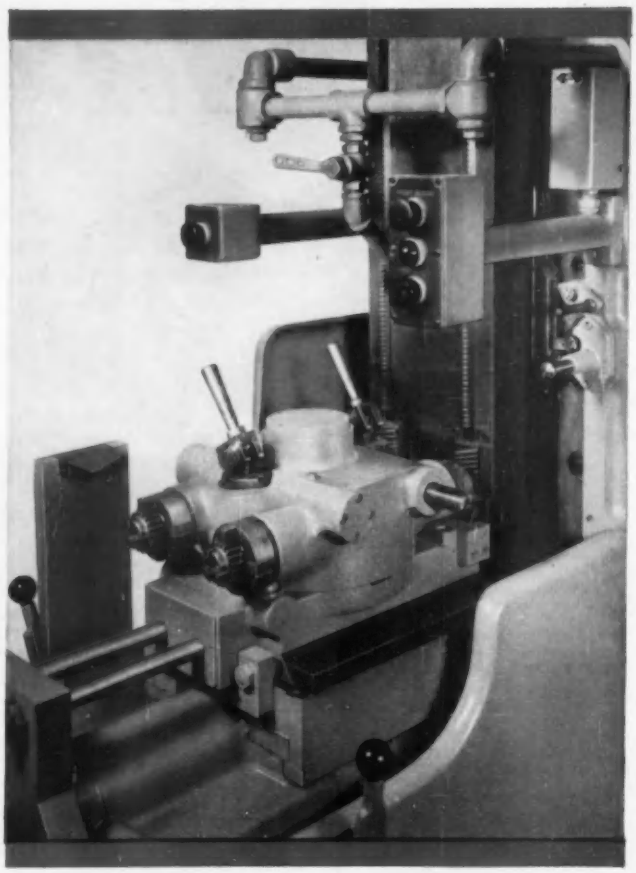
# Completely Equipped Cincinnati Combines Automatic and Manual Indexing to Broach Two Deep Slots in Gears



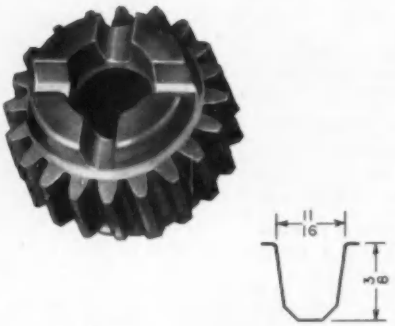



**Photo of part, with drawing to show the shape of slot, broached on the CINCINNATI illustrated here. Production data:**

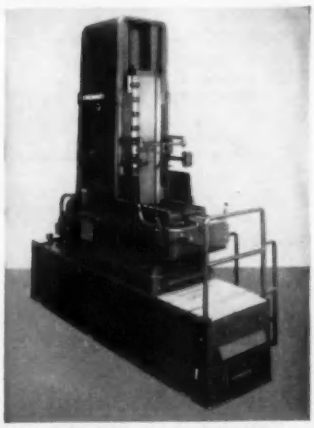
| | |
|---|---|
| *Part name* . . . | Gear |
| *Material* . . . . | Steel |
| *Operation* . . . | Broach slots, radii and chamfer |
| *Production* . . . | 350 per hour |
| *Machine* . . . . | CINCINNATI No. 3-48 Single Ram Vertical Hydro-Broach |

CINCINNATI

◀ **Tapered slots, 3/8" deep, with radius at the top and chamfer at the bottom, are broached in gears, on this completely equipped CINCINNATI No. 3-48 Single Ram Vertical Hydro-Broach.**

Production equipment need not be entirely automatic nor entirely manual. A combination of these two extremes is often an ideal solution for many machining operations. A case in point is illustrated above, designed and built by Cincinnati to broach slots in gears at the lowest cost compatible with production. The fixture is a two spindle four-station unit, incorporating an anti-friction swivel turret for convenience in loading two parts while two others are being broached. ¶ The heavy work is automatic. During retraction of the machine table, the turret section is automatically raised above positioning keys by means of a T-slot cam. At the same time the two work spindles are automatically indexed. Swiveling the turret is manually controlled, but is required only after the second downward stroke of the ram, at which time the part is completely broached. ¶ Of course, the machine itself contributes a large share to this fine production package. CINCINNATI® Single Ram Hydro-Broach Machines have hardened and ground table and ram ways; automatic pressure lubrication; pre-set cycle control for safety; infinitely variable ram speeds and many other advantages. CINCINNATI Broaching Machines and Engineering Service can do an outstanding job for you, too, in reducing costs. May we hear from you?

***Special Machine Tool Division***
**THE CINCINNATI MILLING MACHINE CO. · CINCINNATI 9, OHIO**



**CINCINNATI No. 10-66 Single Ram Vertical Hydro-Broach Machine.** Brief specifications for all sizes in Sweet's Machine Tool File. Complete data in catalog No. M-1745-1.

# CINCINNATI Special Machine Tools and Complete Production Lines

News
OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 117, No. 7 October 1, 1957

## U. S. Rubber Research Unit Opened; Program Readied

A minimum of $120 million will be spent by U. S. Rubber Co. on research and development over the next five years. The figure was disclosed by H. E. Humphreys, Jr., president, at a press conference held in conjunction with the dedication of the company's new Research Center in Wayne, N. J., on Sept. 18.

Situated on a 99-acre tract, the Research Center consists of four major buildings—Main Research, Engineering Research, Chemical Engineering, and Greenhouse. Contained in them are complete laboratories and testing facilities for fundamental research in the fields of rubber, plastics, chemicals, and textiles.

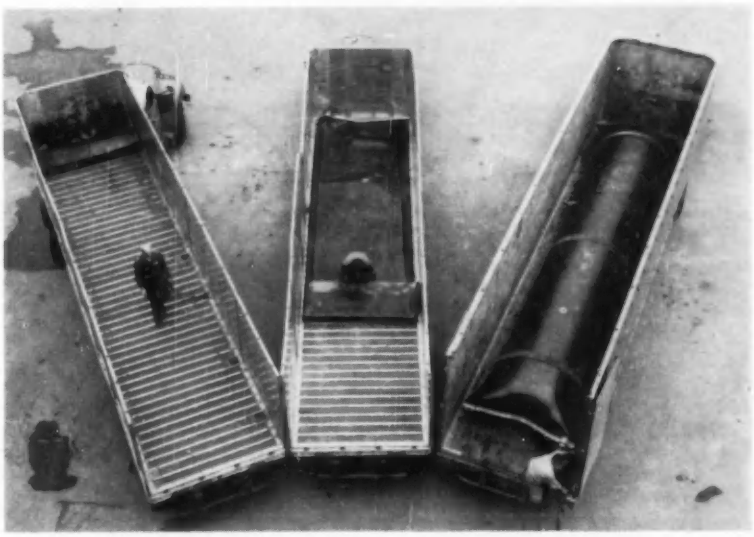
### Objectives of Research Program

Basic aims of the five-year research and development program are threefold. First is the development of entirely safe and trouble-free passenger car tires for high-speed driving.

On this score, U. S. Rubber unveiled three experimental tires of the future. One, made of Vibrathane (a polyurethane rubber), is said to offer 200 per cent more mileage than present tires. Another, made of an improved butyl rubber, affords a smoother ride. The third, made of silicone and wire, can withstand temperatures up to 500 F and is designed for use on supersonic aircraft.

U. S. Rubber predicts that low-profile tires will be standard equipment on all 1959 cars. At present, only the Cadillac Eldorado Brougham is equipped with a low-profile tire.

Second fundamental objective of the program is "to bridge the gap between metals and plastics." Work is being carried forward on a whole new series of rubber types and plastics, as well as combinations.



*Three basic steps convert a trailer truck for dry, liquid two-way haul—dry cargo in one direction to liquid cargo in the same trailer on its return trip Sealdtank unit in truck at left is rolled into compact cylindrical package only 25 in. in diameter. After removal of dry cargo, it is unrolled (center truck) and filled with as much as 20 tons of liquid for return trip, as pictured in truck at right. It can be filled at one end or top.*

Third goal of the research program is the further development of atomic energy applications to the rubber industry. Radiation has already been used to cure rubber, and a whole host of new rubber and plastics materials are expected from atomic energy.

### Other Developments

Since 1948, U. S. Rubber has added 30 new products to the long list of items it makes for the automotive industries. One of the latest additions is a new giant rubber-fabric container for the transportation of liquid cargo (see illustration).

Displayed for the first time at the Research Center, the Sealdtank unit is made of four plies of rubber-coated rayon tire fabric. Both ends are sealed by metal closures. Outer surface is made of neoprene for oil and weather resistance. Inner surface can be made of a variety of special rubber compounds to enable the handling of almost any type of liquid.

Also revealed at the Research Center dedication was an improved type of butyl rubber. Called HTB, it is being used by U. S. Rubber on the production of conveyor belts, hose, and industrial molded products.

## Wider Use of Metallic Colors Foreseen on 1958 Automobiles

Passenger cars will be shinier in 1958 with wider use of metallic finishes and a near-disappearance of dark colors.

Refinement of acrylics and super enamels, which allow more concentration of aluminum pigment, will ex-

# NEWS AUTOMOTIVE AND AVIATION

**STATION WAGON HAS TORSION BAR FRONT SUSPENSION**

*Morris Oxford Traveller, introduced by the British Motor Corp., is an all-steel station wagon with four doors giving full access to the two bench seats, each large enough for three persons and having a center arm rest. The basic 90-cu in. engine is offered with alternative compression ratios of 8.3 or 7.2 to 1. Torsion bar front suspension is combined with leaf spring at the rear.*

tend metallics to most automobile price brackets. Glamour metallics have been in limited use for the past two years, but 1958 will make them universal. Such colors as silver, copper, gold, turquoise, and pink will become more popular.

Black and white, however, will continue as the most popular colors because of their use in two- and three-tone combinations. In 1957, these two basics accounted for nearly one-third of the exterior finishes used. Chrysler reports that 26 per cent of its customers specify white either as a single color or in combination, with blue and white the most common two-tone choice.

According to the DuPont Color Advisory Service, coral-pink, medium gray, light blue and blue-green or turquoise were the most popular colors after white and black. These four categories accounted for about 30 per cent of the exterior paint used.

Dark colors other than black should hold out stronger in the upper price bracket, but the trend is definitely to lighter shades. Medium green, for instance, ranked third by DuPont in 1954, slipped to 15th place in popularity in 1957 with only 1.63 per cent of the total. But coral-pink has climbed during that same period from 17th, with 1.93 per cent, to third, with 9.99 per cent. Incidentally, 1954 was the first year DuPont listed coral-pink as a color category.

The so-called white in 1958 will be toned down even more than current off-whites, approaching a beige.

**BRITISH CAR IS AIMED AT CONNOISSEUR MARKET**

*Riley "Two-Point-Six" is powered by the British Motor Corp.'s 161-cu in. six-cylinder engine, fitted with twin S.U. carburetors, which develops 101 bhp at 4500 rpm. Aimed at the connoisseur market, it features hardwood instrument panel and window mouldings, an adjustable steering column, servo-assisted brakes, and a straight stick gear-shift lever placed at the side of the driver's seat. Front suspension is by torsion bars, and automatic transmission or overdrive is optional.*

### *Edsel Delivers 4095 Cars During First 10-Day Period*

Edsel Div. delivered 4095 cars during its first 10-day period, which included only six selling days. The first day of sales (Sept. 4) Edsel reported 6649 orders and deliveries, although most of the deliveries will show up in later sales reports.

Edsel has an advantage as the first 1958 car on the market and as a completely new automobile, but a counteracting influence which no donbt is holding back some sales is the "wait to see them all" attitude of many buyers. The division's announced sales goal for its first year is 200,000 cars.

### *Gar Wood Will Lease Plant In Pennsylvania for Bodies*

Gar Wood expects to be in production before the end of this year at a new 56,500 sq ft plant at Exeter, Pa. The plant will turn out the Gar Wood-St. Paul line of dump truck bodies. Exeter was selected to give Gar Wood a faster delivery setup in the East to meet heavy customer demand in the area.

The new facility is being built by the Pittston Area Industrial Development Corp., and Gar Wood will lease. This will be the firm's fourth plant making dump bodies, and the first one east of Wayne, Mich. headquarters.

### *Erratum*

In an item appearing in the Tabloid section of AUTOMOTIVE INDUSTRIES (Aug. 1), it was stated that Schwitzer Corp. has completed an agreement with Holset Engineering Co., Ltd. of England to manufacture, sell, and service its bonded rubber vibration dampers, and a range of turbochargers. This statement should have read "*non-bonded* vibration dampers."

### S-P Expects Net by Year-End, Broadens Car Line for 1958

Studebaker-Packard Corp. is banking on a broader line of passenger cars and on continued success of the Scotsman during the coming year to improve its sales volume.

President Harold E. Churchill, speaking at a press preview, said that the company is "targeted for a profitable operating basis by the end of this year."

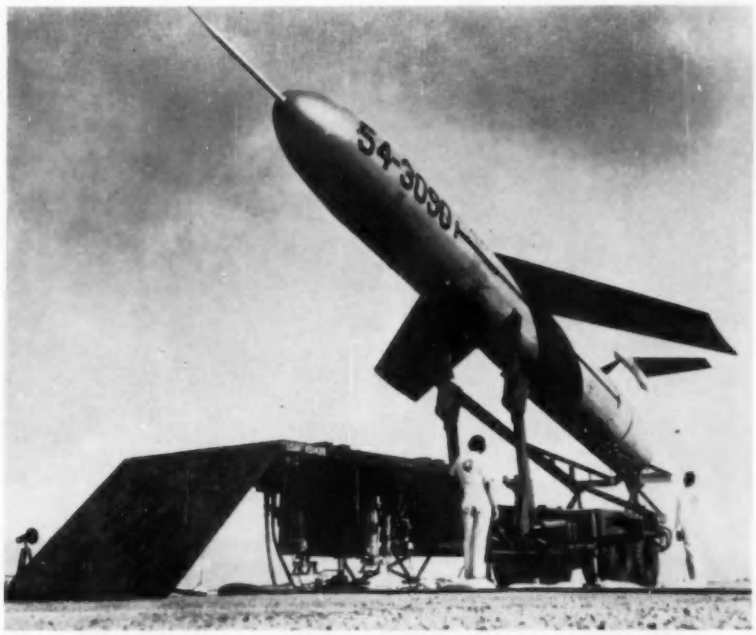
S-P has added two series to the Packard line—the Hawk and a two-door hardtop—bringing to four the total of Packards available in 1958. Production has begun on the new Packard Hawk and on all Studebaker models except the hardtops. Hardtop production is scheduled to begin around Nov. 1, and on the balance of the Packard line around Dec. 1. Packard Hawk production is projected at 2500 units.

S-P will have a total of 13 Studebaker models and four Packards. The short (116.5 in.) wheelbase President models have been dropped. The company also plans to introduce a passenger car smaller and less expensive than the Scotsman, although no details were revealed at the preview. The car is reported to be the Goggomobil (see AI, Sept. 15, page 33).

Three new Mercedes Benz models are being introduced, and one already is on sale in this country. The company has almost 250 dealers franchised to handle the German sports car.

Fourteen-inch wheels are standard on all 1958 models, and dual headlights are standard on all Studebaker and Packard models except the Hawk series, Scotsman, and Champion. There is more distinction stylewise between the Packard and Studebaker, particularly on the front end. The Hawk series has undergone only minor exterior styling revisions.

The Packard Hawk, because of limited production, has a fiberglass nose and hood. The engine is the same 275-hp supercharged unit used in the Golden Hawk. No S-P engines have been changed for 1958.



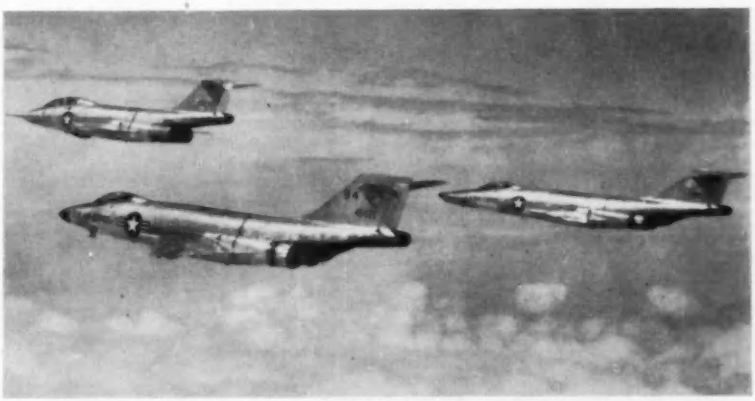

**IMPROVED MATADOR HAS FEWER COMPONENT PARTS**

*The TM-61B Martin Matador ground-to-ground tactical missile is a new, improved version of the TM-61 Matador in operational use for the last few years by the Air Force. Capable of attaining speeds over 650 mph, it is launched from a highly mobile launcher, with initial impetus furnished by a rocket booster. The use of honeycomb has reduced the number of component parts in its wings from 1100 down to 90, and has cut costs by two-thirds.*

### Two Industrial Vehicle Firms Seek to Expand Export Sales

Allis-Chalmers Manufacturing Co. and Clark Equipment Co. have taken steps to broaden their export coverage of the industrial vehicles field. Allis-Chalmers has created a new operating division known as Allis-Chalmers International. The new division, headed by P. F. Bauer, will coordinate all manufacturing, engineering and sales activities outside the United States and Canada. Allis-Chalmers has plants in Essendine, England (wheel tractors, harvesters, vibrating screens) and New Castle, Australia (motor graders).

Clark Equipment has purchased one-third interest in I.T.D. Ltd., of Birmingham, England and plans to begin manufacture of Clark industrial trucks in England. I.T.D. now makes fork trucks. The acquisition was made through Clark Equipment International C.A., a Venezuelan subsidiary of the Michigan firm.



**F-101 ALL-WEATHER PLANE CAN BE REFUELED IN FLIGHT**

*Three versions of the McDowell F-101 Voodoo supersonic series of Air Force planes are pictured together for the first time as they fly in formation. The F-101B (left) is a two seat interceptor designed for duty with the Air Defense Command. The F-101A (foreground), can perform the role of a fighter and is designed to deliver nuclear bombs at extreme distances. The RF-101, the world's fastest photo-reconnaissance plane, is in squadron service with the Tactical Air Command, as is the F-101A. Each of the Voodoo series has in-flight refueling capabilities.*

# NEWS AUTOMOTIVE AND AVIATION

**COMMERCIAL AIR FREIGHTER TO HAVE PROPJET POWER**

*Photograph spotlights powerful four-bladed propellers that will propel America's first turbine-powered commercial air freighter. The new Lockheed Hercules merchant ship of the air will be a more powerful version of the C-130 military cargo carrier. The four 13½-ft props are undergoing tests on the C-130A transport shown here. The commercial Hercules air freighter will be powered by four 4,050-hp Allison-General Motors propjet 501-D engines, developing the equivalent of 16,200 total horsepower. The four-bladed props teamed with the more powerful turbines will lift more than 22 tons from virtually any airport, anywhere in the world, and carry the cargo at 350-mph speeds.*

### *Williams To Succeed Cronin As AMA Managing Director*

Harry A. Williams has been named to succeed William J. Cronin as managing director of the Automobile Manufacturers Association when Cronin retires Nov. 15.

Williams has been public relations director of AMA since 1952. He joined the association in 1942 as editor of *Automobile Facts*, and was named director of information in 1949. Prior to joining AMA he was associate editor of *Automotive News*.

Cronin, who joined AMA in 1933 when the organization was still known as the National Automobile Chamber of Commerce, served as managing director since March, 1948. During World War II he held executive posts on both the Automotive Committee for Air Defense and the Automotive Council for War Production.

### *Highway Program Is Linked With Urban Redevelopment*

The Federal highway program must be made to fit in with a good program of urban redevelopment, if the cities are to get the maximum amount of benefit from the new system of expressways.

So spoke Bertram D. Tallamy, Federal Highway Administrator at a three-day conference held recently in Hartford, Conn., under the auspices of the Connecticut General Life Insurance Co. Theme of the conference was: "The New Highways: Challenge to the Metropolitan Area."

Addressing 400 planners, Government officials, and business and civic leaders attending the sessions, Mr. Tallamy warned that the success of the Federal express highway program depended upon the "cooperative effort of both public and private agencies of the urban areas, working with State highway departments."

Reviewing the accomplishments of the program since 1956, he pointed out that 1780 miles of Interstate System have been placed under construction contract, involving about $775 million in Federal aid. In addition, $552 million has been set aside for design and purchase of right-of-way.

Frazar B. Wilde, president of Connecticut General, observed that many reforms and innovations are needed not only for the success of the highway program, but for the rehabilitation of large metropolitan areas. Among the requirements he listed were: Greater overall regional planning, an integrated transport system, tax and fiscal reform, and up-to-date zoning.

### *Motor Products Plans to Spend $11 Million on New Activities*

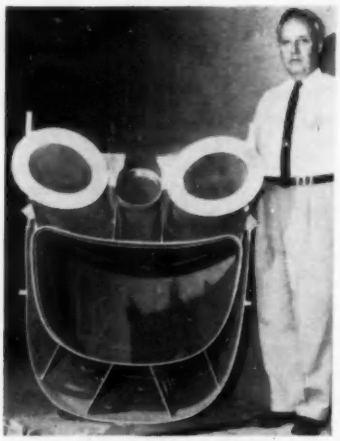
Motor Products Corp., which will complete production this fall on its aircraft parts contracts, has purchased 100,000 shares of common stock of Holland Furnace Co., Holland, Mich. Motor Products has been liquidating assets and looking for new activities.

Holland Furnace is the only current holding of the former automotive parts manufacturer, although the company has announced that it has some $11 million to spend to acquire new business interests.

The investment in Holland Furnace totalled about $1.3 million. Holland had 883,584 shares outstanding as of June 30.

**JET TRAINER HAS MANY FEATURES OF JET FIGHTERS**

*TT-1 Pinto, the Navy's new primary jet trainer was designed to make a student into a jet pilot in one aircraft—the first one he flies. Built by Temco Aircraft Corp., the TT-1 has many features of operational jet fighters. These include ejection seats, liquid oxygen equipment, speed brakes, and controls and instrument panels comparable to those on jets the student will fly later. Top speed of the TT-1 is nearly 300 knots, but it can land at only 62 knots. Provided with a jet engine of 920 pounds thrust, the TT-1 was structurally designed to accommodate higher-powered engines if desired.*



**MAGNESIUM CASTING**

*This airscoop section for Chance Vought Aircraft's Regulus II guided missile is described as the largest thin-wall magnesium casting made in one piece. Rear view shows two large boundary layer ducts at top, plus a small one between them to supply air to missile's air conditioning equipment.*

### Buick To Offer New Series, New Transmission in 1958

Buick will have a new luxury series at the top of the line in 1958 as a part of the division's efforts to regain third place from Plymouth. The series, called the Limited, will be 8 in. longer than the Roadmaster, although wheelbase will be the same, and it will have more luxury items and trim, particularly on the rear fenders. Extra length will come in the rear quarter panels and deck.

Buick also will introduce its new triple turbine Dynaflow transmission for all models, although the current transmission will not be dropped entirely. Air suspension will be optional on all models. General manager Edward T. Ragsdale, speaking at the press preview, said Buick is currently calculating air suspension installation at about 25 per cent of production.

Air cooled aluminum front brakes will be used on all but the Special series. Fifteen-in. wheels will be retained.

Ragsdale said that about 125,000 '58 Buicks will be built before the end of the calendar year. This would give Buick a 1957 production total of about 424,000 cars. He also predicted that the industry would "produce and sell" six million cars in 1958, including foreign cars sold here. He estimated the small car market at about 4 per cent of the total market.

With the Limited series, Buick will have five series and 20 models in 1958.

# AI TABLOID

**Du Pont Co. plans to manufacture industrial film from its new Teflon 100-X resin, which is now in the experimental stage but may be ready for production in 1959.**

* * *

**Solar Aircraft Co. is designing a new variable-speed gas turbine engine for the Army's flying platform that will weigh only 50 lb and have a maximum diameter of 15½ in.**

* * *

**Bell Telephone Laboratories has developed a new adhesive for bonding polyethylene to rubber, brass or brass-plated metals that is said to resist a pull of about 1000 psi.**

* * *

**United States Chemical Milling Corp. has installed a huge vertical tapering tank for chemical milling at its Manhattan Beach, Calif., plant, which extends 60 ft underground and is designed to meet the demand for extremely long tapered structures in advanced aircraft.**

* * *

**Sperry Gyroscope Co. has been awarded more than $47 million in contracts for missile guidance systems for TALOS, the Navy's long-range, surface-to-air missile.**

* * *

**Bendix Aviation Corp.'s computer division is opening a new district office to handle sales, service and applications of its general-purpose electronic computer in the New York area.**

* * *

**Goodyear Tire & Rubber Co. has purchased the rights to a new curing method for retreading tires that will cut the average curing time about 50 per cent and assure more uniform cures.**

* * *

**A Boeing Airplane Co. study predicts that U. S. domestic airline traffic will increase more than 400 per cent from 1955 to 1965, and that most of the increase will be due to the introduction of jet transports into airline service.**

* * *

**American Iron and Steel Institute reports that more steel was made in the U. S. in the first eight months of 1957 than in any like period. Previous high was 72.3 million tons in 1953, as compared with 76.6 million tons this year.**

**Parker Appliance Co. has agreed to purchase all stock of Hannifin Corp., manufacturers of hydraulic and air power cylinders and presses.**

* * *

**The Navy announced that it is ending operation of its supersonic wind tunnel at the Ordnance Aerophysics Laboratory because the facility has become obsolete and funds for modernization are lacking.**

* * *

**Dow Chemical Co. plans to continue its "vigorous expansion" program in the current fiscal year, and expects to exceed the record $162 million spent in fiscal 1957.**

* * *

**Fruehauf Trailer Co. has made a long term lease agreement with the city of Decatur, Ala., under which it will operate a city-financed $3 million aluminum extrusion plant to be built west of the city proper.**

* * *

**Aluminum Co. of America is establishing a fundamental research facility for aluminum foil and packaging at New Kensington, Pa., to be known as the Foil and Packaging Div. of Alcoa Research Laboratories.**

* * *

**With the completion of a new addition to its Toledo, O., plant, Barrett Div. of Allied Chemical & Dye Corp. has more than doubled its production capacity of Plaskon polyester.**

* * *

**Kelsey-Hayes Co. has acquired Heintz Mfg. Co. of Philadelphia, subject to approval by Heintz stockholders, and will operate the plant as a division of the parent company. . . Haveg Industries, Inc. has acquired Reinhold Engineering and Plastics Co., Inc., as a wholly owned subsidiary.**

* * *

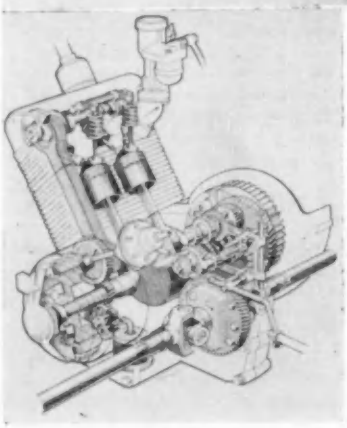
**Sun Oil Co. has completed a new $2.5 million laboratory at Marcus Hook, Pa., that will house all "R & D" divisions dealing with manufacturing and marketing.**

* * *

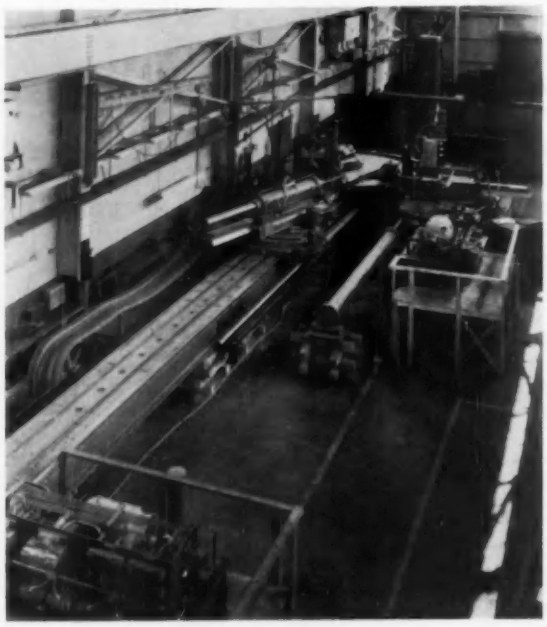
**As a result of an overall review of its surface-to-surface missile program, the Navy has cancelled further development work on the Triton missile on which it has spent $24 million to date.**

# News AUTOMOTIVE AND AVIATION

## SMALL CAR



The NSU-Werke of Neckarsulm, Germany, has re-entered the car field after nearly 30 years of concentrating on motorcycles, with the introduction of the Prince, a small four seater. It is powered by a 36.6 cu in. rear mounted engine with an unstressed rating of 20 bhp at 4800 rpm, and a maximum torque of 30 lb/ft at 2300. The two cylinder air-cooled unit features an overhead camshaft driven by a pair of connecting rods and eccentrics, instead of the usual timing chain. The four-speed constant-mesh transmission and differential are integral with engine. Car weight is 1080 lb.



## DRAW FORMER

*The largest radial draw former ever built is shown above during assembly and test in the plant of the Cyril Bath Co., Solon, O. The machine for forming curved bulkheads and sheets has just been shipped to Convair, a division of General Dynamics, San Diego, Calif., for use in forming curved extrusions and sheets for the new Convair 880 jet airliner. When installed at Convair, much of the machine will be below floor level.*

### White, International Truck To Introduce New Rear Axles

White Motor Co. and International Harvester have announced new truck rear axles designed for heavy duty use.

White's new single reduction axles are said to boost reserve torque capacity at least 20 per cent. Both axles (124C and 134C) are capable of pulling loads up to 76,800 lb GCW in mountainous terrain, according to White, and provide fast gear ratios for high road speeds on direct drive. The 124C is rated at 20,000 lb, 134C at 23,000 lb.

International is building four new two-speed planetary type rear axles which the company says will enable it to hold production delays to a minimum. The axles are the RA-146, rated at 18,500 lb with differential assembly to handle up to 50,000 lb GCW; RA-151, rated at 22,000 lb, differential assembly up to 55,000 lb GCW; RA-156, 22,000 lb and oversize differential up to 65,000 GCW; and RA-157 (off-highway), 23,000 lb and differential up to 30,000 GVW.

### Amoco Chemicals Shuts Down Synthetic Gasoline Plant

Amoco Chemicals Corp. is closing down its hydrocarbon synthesis and chemical recovery plant at Brownsville, Texas. The plant was the first in the world to make synthetic gasoline and chemicals from natural gas in commercial quantities.

Commenting on the reason for closing, Jay H. Forrester, company president, said that while the plant was a technical success it could not make gasoline from natural gases at current market prices as cheaply as they can be made by other processes.

The synthetic gasoline plant was built in 1950 by Carthage Hydrocol, Inc., and taken over by Amoco Chemicals, a Standard Oil Co. (Indiana) subsidiary, in 1954.

Adjoining chemical recovery, storage, and shipping facilities will also be closed down, Forrester said.

### Ford of Canada To Drop Monarch Brand in 1958

Ford of Canada will drop the Monarch brand during 1958 and Ford-Monarch dealers have taken on the Edsel, which is produced in Oakville, Ont. The Meteor, however, will be retained during the coming year.

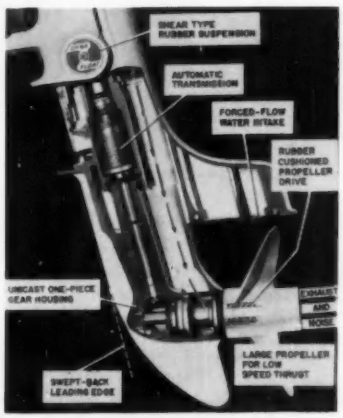
Monarch and Meteor are essentially Mercury and Ford cars with redesigned grille and crest.

### Kiekhaefer Adds Three Models To Its Outboard Motor Line

Kiekhaefer Corp. is adding three new models to its line of Mercury outboard motor boat engines for 1958, bringing the total line of basic models to nine.

The additions are the Mark 78, a six cylinder outboard with 66 cu in. displacement; the four-cylinder Mark 58 with 44 cu in. displacement; and the two-cylinder Mark 28 with 22 cu in. displacement.

Horsepower ratings and advanced engineering features of the new models were not disclosed, but company officials indicated there would be increases in horsepower and performance. They also announced that a "super-powered, high performance outboard of advanced design" would be unveiled at the New York Boat Show in January.




*New Mercury Mark 28 cut-away shows engineering features incorporated in this 22-cu-in. outboard. It provides one hand control of forward-neutral-reverse shifting, as well as steering and speed. Fifteen degree slanted design allows the outboard to slide over submerged or floating objects. Propeller hub exhaust outlet buries noise and gases in the propeller slipstream.*

### U. S. Rubber Building Car Tire With Double-Strength Nylon

U. S. Rubber Co. has a new premium tire (U. S. Royal Master) made with double-weight nylon cord with a tensile strength of 52 lb, compared with 29 lb standard.

The company tested the tire on a Convair airplane, which landed at 140 mph with a load seven times that of a normal automobile tire load. Tests indicate 37 per cent greater mileage over the average for other premium tires and 18 per cent over the best of the other tires tested, according to U. S. Rubber.

*Mack cross-country luxury bus accommodates 41 passengers*

### Mack Trucks Introduces Inter-City Luxury Bus

Mack Trucks, Inc. has entered the long-distance bus market with a new inter-city luxury bus.

The new vehicle will seat 41 passengers and features air conditioning, airglide suspension, foam rubber reclining seats, and individually controlled double reading lamps.

The bus is powered by Mack's turbo-charged Thermodyne Diesel engine, and is equipped with a specially designed four-speed transmission. Other features include power steering, all-welded tubular framing, and spacious baggage compartments.

Elliott G. Ewell, Mack vice-president—sales, said that the new luxury model will be an all-Mack product, with all major components such as engine, transmission, axles, and body produced by the company.

### Automobile Companies Eye Higher Price Market in '58

While automobile companies have shown a great deal of interest in the small economy car, they are by no means neglecting the market possibilities of the upper-medium and higher priced cars.

The Edsel, of course, is the outstanding example of this interest in the market above the low-priced field. Ford Motor Co. expects to sell 200,000 Edsels during the coming year, and at the same time boost sales of its other medium price car, Mercury.

Mercury, meanwhile, is adding a model—Park Lane—to the top of the line in an effort to hang on to Mercury owners who otherwise might move up to the Lincoln class. Park Lane will be longer in wheelbase and overall length than the other Mercury models.

Buick and Pontiac likewise will add models at the top of their lines. The Buick Limited will be eight inches longer and carry more luxury trim and accessories than the rest of the line.

Chevrolet is reported to be reaching upwards with its Impala, and Packard will have its own version of the Studebaker Hawk.

The only exception to this trend appears to be at American Motors, where the price of the AMC senior models probably will come down. The company plans to use one basic body shell for its senior cars and Rambler in 1958. AMC also plans to bring back its 100 in. wheelbase Rambler, priced below the current Rambler models.

### All 1958 Passenger Cars In Production by Mid-Oct.

All 1958 passenger cars will be in production by mid-October, when Cadillac is scheduled to begin building its new models. Other General Motors divisions were slated for production before the middle of the month.

All Chrysler Corp. divisions began production before the end of September, with brief periods of shut down.

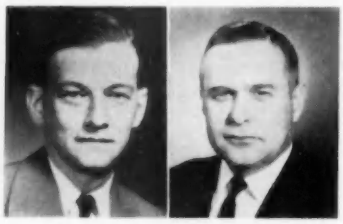
Lincoln has been in new model production since August 1, Edsel since July, and Ford and Mercury Divs. will be in full production before mid-October.

American Motors has been building new cars since early September, and Studebaker since mid-September. One Packard model is in production, the others are scheduled for phase-in during November and December.

(*Turn to page* 136, *please*)

# MEN IN THE NEWS

*Ford Motor Co.—Charles R. Beacham has been elected vice-president of Ford Motor Co. and assistant general manager of Ford Div.*



*Chrysler Corp.—Robert J. Kelly has been appointed director of public relations, Chrysler Div., and James S. Brierley has been named chief engineer, research planning, coordination and administration.*

*United States Rubber Co., U. S. Tires Div.—Walter F. Brown has become general sales manager.*

General Motors Corp.—**Gilbert K. Hause** has been appointed engineer in charge of the Engineering Staff Transmission Development Group, and **Peter Kyropoulos** has become executive in charge of technical development of General Motors styling.

General Electric Co. — **Jack S. Parker** has been appointed vice-president—public and employe relation; **John B. Montgomery**, general manager of the Aircraft Gas Turbine Div.; and **Lyman R. Fink**, general manager of the X-Ray Dept.

Ford Motor Co., Tractor & Implement Div.—**R. J. Miller** was named chief engineer; **C. B. Richey**, chief engineer, Research Engineering Dept.; **A. C. Quinn**, manager, Engineering Test Dept.; **C. T. O'Harrow**, chief tractor engineer, Tractor Engineering Dept.; and **R. L. Erwin**, manager, Engineering Administration and Services Dept.

Buick Motor Div., General Motors Corp.—**Oliver K. Kelley** was named chief engineer; **Edward C. Kennard**, general sales manager; **James S. Hudgens**, assistant general sales manager; and **Frank M. Leigh**, Pacific regional manager.

Caterpillar Tractor Co.—**Hugh Boggs** has been named manager of planning and plant engineering; **Roy McCluskey**, manager of production control; and **Dale Wright**, manager of quality control.

Olin Mathieson Chemical Corp.—**L. P. Nelson** has been appointed director of transportation.

Kenmetal Inc. — **Wilbur L. Kennicott** has been elected a vice-president.

Ford Div., Ford Motor Co.—**Walter J. Cooper** has become general sales manager.

Goodyear Tire & Rubber Co.—**F. W. McConkey, Jr.**, has been named assistant vice-president in charge of petroleum sales activities.

Aeroquip Corp. — **John C. Abbey** was named chief engineer.

Allison Div., General Motors Corp. —**Dan H. Butler** is now assistant comptroller.

Ford Motor Co., Aircraft Engine Div.—**Herbert G. Lindberg** was named general manufacturing manager.

Waukesha Motor Co.—**Newton H. Willis** is now in charge of all engineering activities.

Convair Div., General Dynamics Corp—**Robert E. Honer** has been appointed chief electronics engineer.

Crucible Steel Co. of America—**John H. Hoke** has become supervisor of the Stainless Steels Section of the Central Research Laboratory.

Vanadium Corp. of America—**Raymond H. Filsinger, Jr.**, has been elected vice-president in charge of sales.

Cincinnati Milling Machine Co.—**Robert Bevis** has become assistant domestic sales manager.

Goodyear Tire & Rubber Co.—**Melvin A. Wilson** has been appointed manager-engineering, truck tire development; **Philip W. Drew**, manager-engineering, automobile tires; and **C. Robert Case**, development manager-tires, Goodyear International plants.

Vickers Inc.—**E. J. Doucet** has been named director of advertising and public relations.

*Bendix Aviation Corp. — Charles C. Tillinghast, Jr., is now vice-president in charge of foreign investments and plants.*

*Lincoln and Mercury Div., Ford Motor Co. —Joseph E. Bayne was made general sales manager.*

### Necrology

**Andre Fraschetti**, 29, chief designer for the Ferrari racing car factory, died recently, at Modena, Italy.

**Roy H. Kienle**, 61, director of Research Service Dept., Stamford Laboratories, of American Cyanamid Co., died Sept. 2, at Stamford, Conn.

**Donald W. Sniper**, 33, district manager for Willys Motor, Inc., in the Detroit zone, died Sept. 3, at Toledo, O.

**William E. Simons**, 62, a former manager of the old Ford Motor Co. assembly plant in Milwaukee, Wis., died Aug. 21.

**Edgar L. Longaker**, 75, pioneer in the development of storage batteries for submarines and automobiles, died Aug. 29, at Norristown, Pa.

Automatic in operation at Clinton Machine Co. Texaco-lubricated machines have helped turn out a total of over 6,000,000 engines.

# Texaco Cleartex gives Clinton longer tool life, more pieces per grind

These are the fine results which Clinton is achieving with *Texaco Cleartex Oil B* in their automatics.

**Machine:** Gridley
**Part:** Valve seat insert
**Metal:** Ampcoloy 45
72 hours or 20,000 pieces per tool grind

**Machine:** Brown & Sharpe
**Part:** Wrist pin
**Metal:** B 1113
8 hours or 3,000 pieces per tool grind

**Machine:** Fellows Gear Shaper
**Part:** Spur gear (2¼" blank)
**Metal:** Cast steel
1,500 to 2,000 pieces per tool grind

To produce its engine parts, the Clinton Machine Co., Maquoketa, Iowa, uses a sizable battery of automatics for its machining. On the recommendation of a Texaco Lubrication Engineer, they are using *Texaco Cleartex Oil B* with, as their Superintendent reports, "excellent results". (Check the box at the left).

*Texaco Cleartex Oil* is used by many manufacturers as a tri-purpose oil—cutting, lubricating, hydraulic—in their automatics. The results include long tool life, excellent rust prevention, non-dilution of cutting oil, and full protection for machines.

There is a full line of *Texaco Cutting, Grinding and Soluble Oils* to help you do all your metal working better, at lower cost. Let a Texaco Lubrication Engineer suggest the best ones for you. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

**TEXACO CUTTING, GRINDING, SOLUBLE AND HYDRAULIC OILS**

PRODUCTION MACHINERY

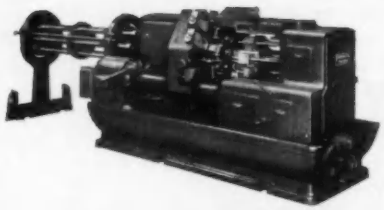
**GREENLEE**

# AUTOMATIC BAR MACHINES

## HELP YOU BEAT RISING PRODUCTION COSTS

The cowman achieves speed and power in a good "using" horse by years of careful breeding . . . Greenlee develops these same qualities in its Bar Automatics by continuous research and design improvement. One of the many superiorities of this speed and power is that it enables you to take full advantage of modern tooling practices. Your Greenlee representative will be glad to show you how it is done. Please submit print when inquiring about a specific job.

***Write for Catalog No. A-405***



**SIX AND FOUR-SPINDLE AUTOMATIC BAR MACHINES**

**GREENLEE Special Machine Tools**

- Multiple-Spindle Drilling and Tapping Machines
- Transfer-Type Processing Machines
- Hydro-Borer Precision Boring Machines

**GREENLEE**
BROS. & CO.

**1760 MASON AVE.**
**ROCKFORD, ILL.**

## What Are **Your** Special Universal Joint Requirements?

Anything from a heavy duty close coupled double universal joint like the one pictured above to a small power take-off joint (shown below) is right down "Cleveland's" alley. Limited joint length and diameter can probably be met with standard "Cleveland" components—and at a substantial saving to you.

Look to "Cleveland" for propeller shaft and universal joint requirements. We've been suppliers to the automotive and allied industries since 1912.

**Cleveland Steel Products Corporation**
Automotive Division
16025 Brookpark Road · Cleveland 11, Ohio

*Manufacturers of*

CLEVELAND

**Universal Joints · Propeller Shafts and Power Take-Off Joints**

# MORE EFFICIENT DESIGN, IMPORTANT SAVINGS, SIMPLIFIED ASSEMBLY, BETTER APPEARANCE

**These are some of the many benefits reported by Design Engineers who have adopted TRU-LAY PUSH-PULLS for remote control operations on literally hundreds of products**

***Here are typical comments*** recently received from equipment manufacturers whose machines or implements are equipped with these accurate and dependable remote controls:

**Saves Time, Labor and Material**
"The use of your flexible Push-Pulls saves us a great deal of time, labor and material. The old linkages frequently required much planning in both engineering and shop which is not required now. On some of our equipment we use Push-Pulls from 10 to 30 feet in length. They operate clutch controls on the Main Power Unit, Feed Conveyors and Delivery Conveyors."

**Greater Flexibility of Design**
"The principal advantage of Tru-Lay Push-Pulls in our application is that they permit flexibility in locating the control valve in relation to the operator's position."

**Cost Less to Install**
"Tru-Lay Push-Pulls are easier and less expensive to install than linkages for remote control of power take-off, brake and clutch. Better appearance, too."

**Simple and Neat**
"For several models of farm tractors, we selected your controls for their simplicity and neatness of application as governor controls."

**Solution to Tough Problem**
"Can be installed where straight rods are impossible . . . for Remote Control of transmissions, brakes and clutches."

**Eliminates Maintenance**
"Simple operation and elimination of maintenance problem are the major advantages in using your Push-Pulls."

**Reduces Number of Parts**
"Your Push-Pulls have eliminated links, radius rods and other lost-motion devices for remote control of hydraulic valves."

**Provide ACCURATE Control**
"Tru-Lay Push-Pull control cables provide minimum back-lash, even in installations up to 30 feet in length, because the cable is designed to close tolerances with minimum drag and lost motion."

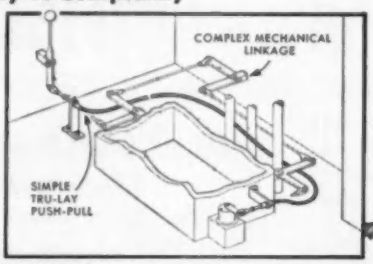
• • •

**TRU-LAY PUSH-PULLS** are "Solid as a rod but *Flexible* as a wire rope." This flexibility makes it possible to snake around obstructions . . . permits the ideal arrangement of all elements of remote controls.

***Advantages** of Tru-Lay Push-Pull flexibility and simplicity are pictured below—*

**Simplicity vs Complexity**

Compare the TRU-LAY PUSH-PULL cable in illustration with the mechanical linkage. PUSH-PULLS are simple, have but one moving part, are noiseless and give lifetime service accuracy. Linkages are complex, made of many parts; they wear at many points. Their use brings increased backlash, lost accuracy and vibration rattles.




**Construction Equipment** and **Farm Implements** provide good examples of the wide-spread use of these accurate, simple and dependable Push-Pulls. On Power Shovels, Winches, Graders, Road Oilers, Dump Trucks, Snow Plows, Engine-driven Pumps, Crushers, Tractors, Combines, Corn Pickers, Corn Row Sprayers, Corn Detasslers, Orchard Sprayers, Power-driven Tree Trimmers, Tobacco Picking Machines and others . . .

TRU-LAY PUSH-PULLS are operating unfailingly for the remote control of Hydraulic and Air Valves, Brakes, Clutches, Transmissions, Throttles, Chokes, Governors, Power Take-Offs, Spray Nozzles, Vent Directional Fins and on many other applications.

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## There is No Worry about Failures or Maintenance Costs with TRU-LAY Push-Pull Remote Controls

**Long Life** is a matter of record. We have never heard of a Tru-Lay Flexible Push-Pull Control wearing out in normal service. Failures, that sometimes harass users of more complex controls, are eliminated by the use of these simple, positive-action controls.

**Dependable Operation** of these controls is a certainty, even under the most adverse conditions . . . HOT as jet engines (note: Tru-Lay Push-Pulls are actually performing on hot jet applications) . . . COLD to 70° F below zero . . . SOAKIN' WET . . . ABRASIVE . . . or just plain TOUGH.

**Freedom from Trouble** is assured because of such features as . . . full protection of the inner, working member by the tough flexible conduit . . . lubrication of the inner, working member *for life* during assembly . . . seals that keep moisture, dust and other foreign matter out of the unit . . . cold swaging of fittings that makes them integral parts of the control unit.

**Accuracy** is inherent in the basic design of Tru-Lay Push-Pulls. They are precision products, not gadgets.

**Capacity** ranges from light jobs up to jobs of 1,000 lbs. input. These Push-Pulls will handle jobs 150 feet or more from the control point.

**"Solid as a rod, Flexible as a wire rope"** aptly describes Tru-Lay Push-Pull Controls. This flexibility provides positive, remote action whether anchorages are fixed or movable . . . it damps out noise and vibration . . . it greatly simplifies installation of controls by reducing the number of working parts and by making it possible to snake around obstructions.

**Adaptability** to all sorts of mechanical situations explains, in large measure, the wide-spread application of Tru-Lay Push-Pulls. Standard anchorages, fittings and heads have been designed that meet requirements on approximately 80% of the installations. Simple modifications of these standards, or minor changes in your own design, cover almost every special situation. Our engineers have the know-how on such matters, and will work with you.

**For Further Information**—The DATA FILE pictured at the left contains six booklets and bulletins that will answer any further questions you may have about this versatile and dependable tool. It is quite likely that this material will point the way to a simplified solution of your remote control design problems. Write for a copy.

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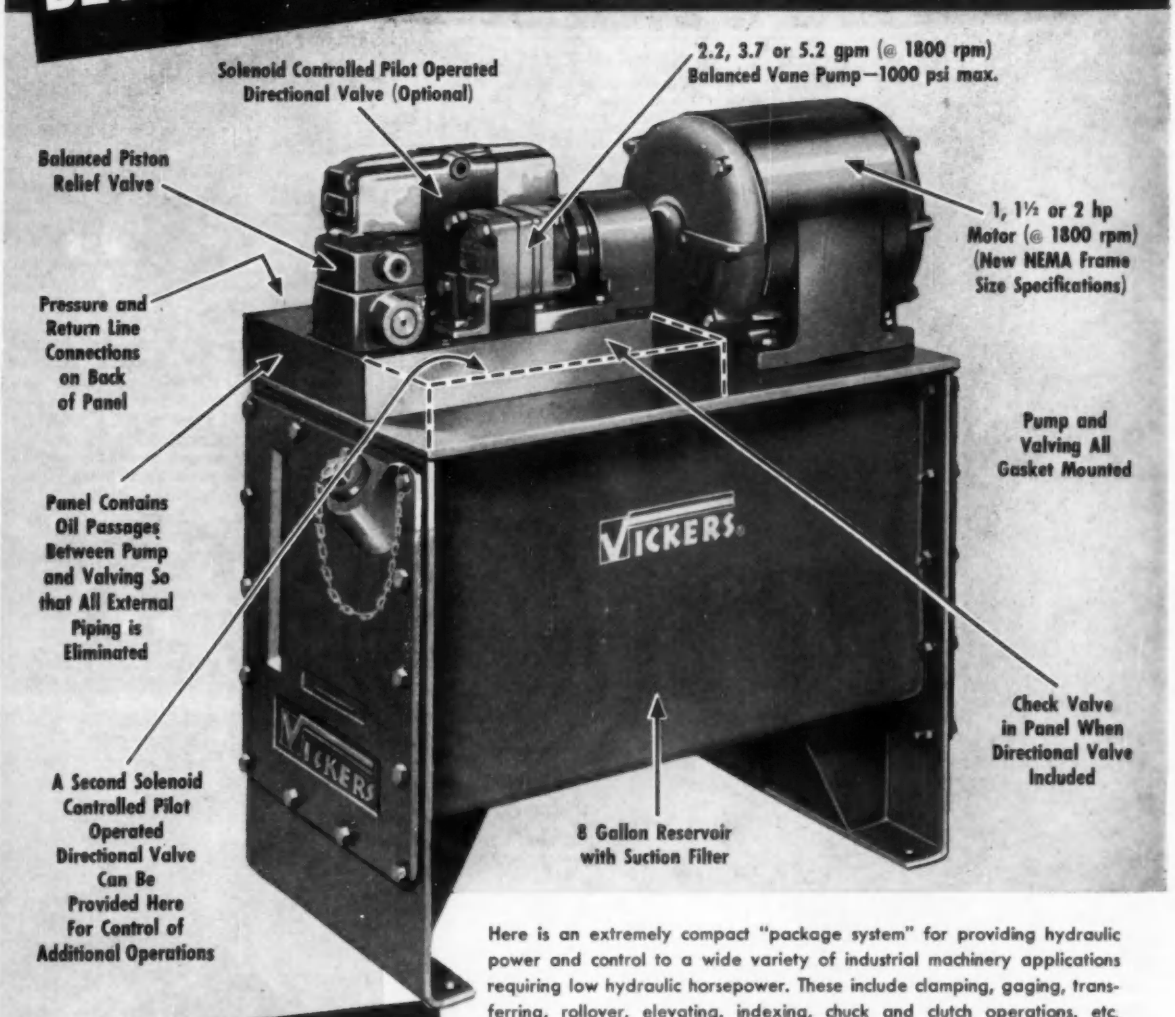
Solenoid Controlled Pilot Operated Directional Valve (Optional)
2.2, 3.7 or 5.2 gpm (@ 1800 rpm) Balanced Vane Pump—1000 psi max.
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Pressure and Return Line Connections on Back of Panel
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Here is an extremely compact "package system" for providing hydraulic power and control to a wide variety of industrial machinery applications requiring low hydraulic horsepower. These include clamping, gaging, transferring, rollover, elevating, indexing, chuck and clutch operations, etc.

Note the many features indicated on the photograph above. The result is improved and simplified hydraulic design . . . also reduced installation and maintenance costs. This "package system" has great flexibility . . . is available in a wide variety of combinations of standard components assembled to suit individual requirements. Pretested and ready for immediate operation, it has also the advantage of undivided Vickers responsibility. For further information, ask for installation drawings 178706-8.

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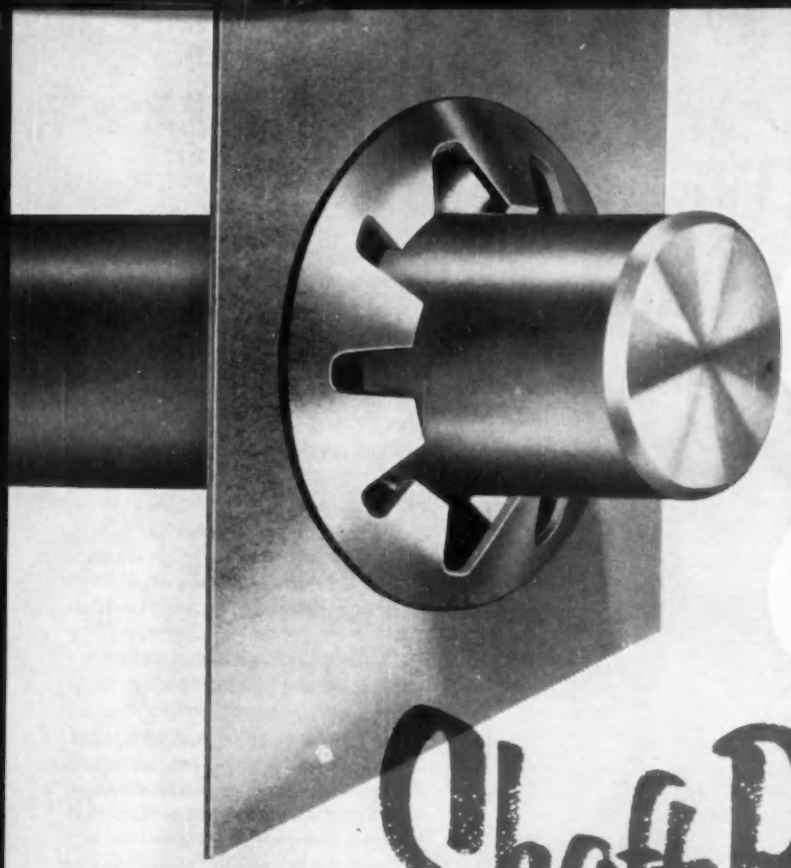
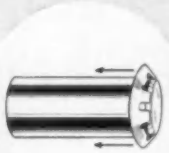
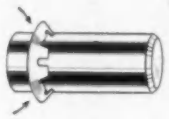




*Pilot teeth guide fastener on for easy hand starting.*



*Hardened spring steel teeth bite in, resist dislodging force.*

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# Secrecy Wraps Taken Off Timken Automatic Plant

**By Charles A. Weinert**

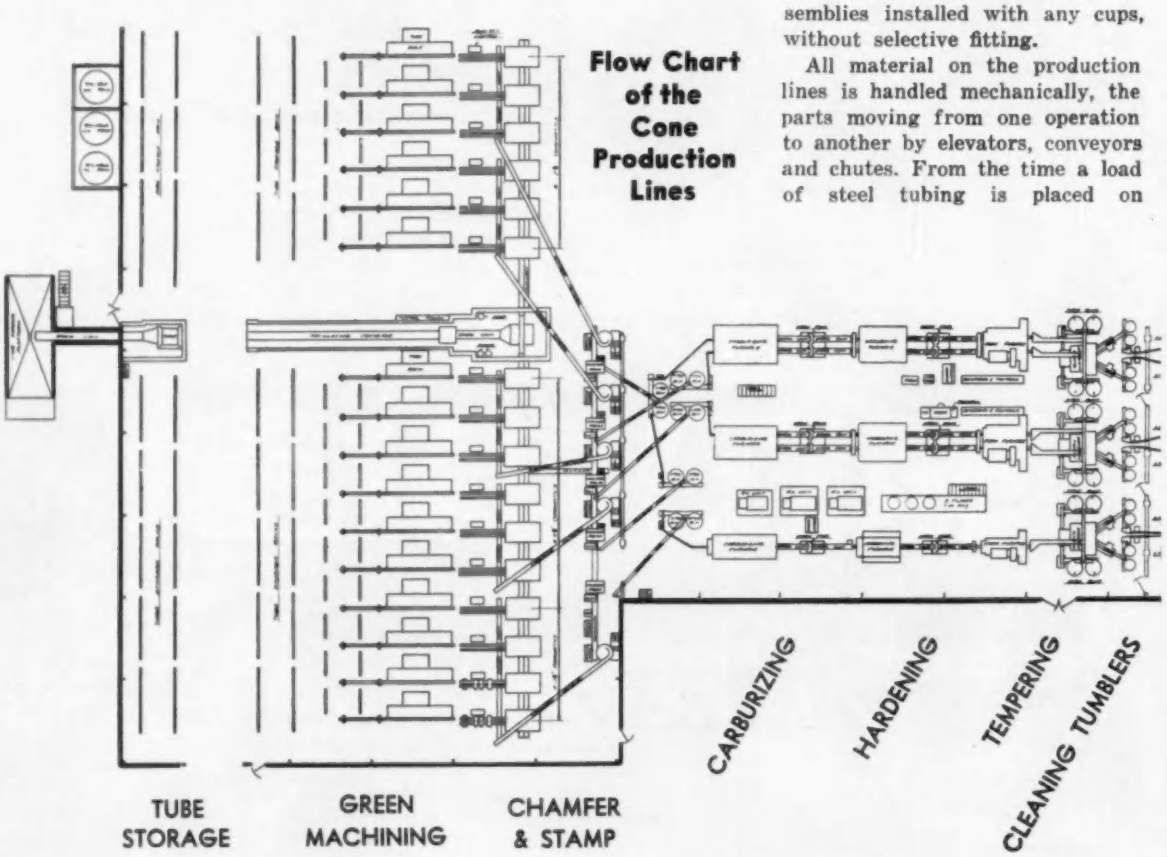
KEPT under wraps since its inception about 10 years ago, the new Bucyrus plant of The Timken Roller Bearing Co. was recently opened to visitors for the first time. The setup of the plant is novel and ingenious in many respects. It is, for all practical purposes, a completely automatic manufacturing facility. The reasoning behind the prior close-guarding of its advanced features is understandable.

Built from the ground up in the rural area of Bucyrus, Ohio, the plant is situated between the Pennsylvania Railroad and U. S. Route 30. Floor space totals about 180,000 sq ft. Investment in plant and machines was about $12½ million, which at today's market prices is estimated to be equivalent to more than $20 million. To date, Bucyrus has produced over 167 million pieces. Current annual production capacity is 33 million cups and 27 million cones.

Operating on a three-shift basis, normally five days per week, personnel totals around 735. Output per man per eight-hour day is on the order of 190 bearings.

The production setup encompasses a total of 10 lines—five lines each for cups and cones. At present the cone lines are handling one to four different sizes per line; while the cup lines are handling from four to ten different sizes per line. At the ends of the lines, cone assemblies and cups are packaged separately. The parts are made to tolerances so closely controlled that bearing size-for-size the cones can be assembled with any one size standard rollers, and the cone assemblies installed with any cups, without selective fitting.

All material on the production lines is handled mechanically, the parts moving from one operation to another by elevators, conveyors and chutes. From the time a load of steel tubing is placed on




**Flow Chart of the Cone Production Lines**

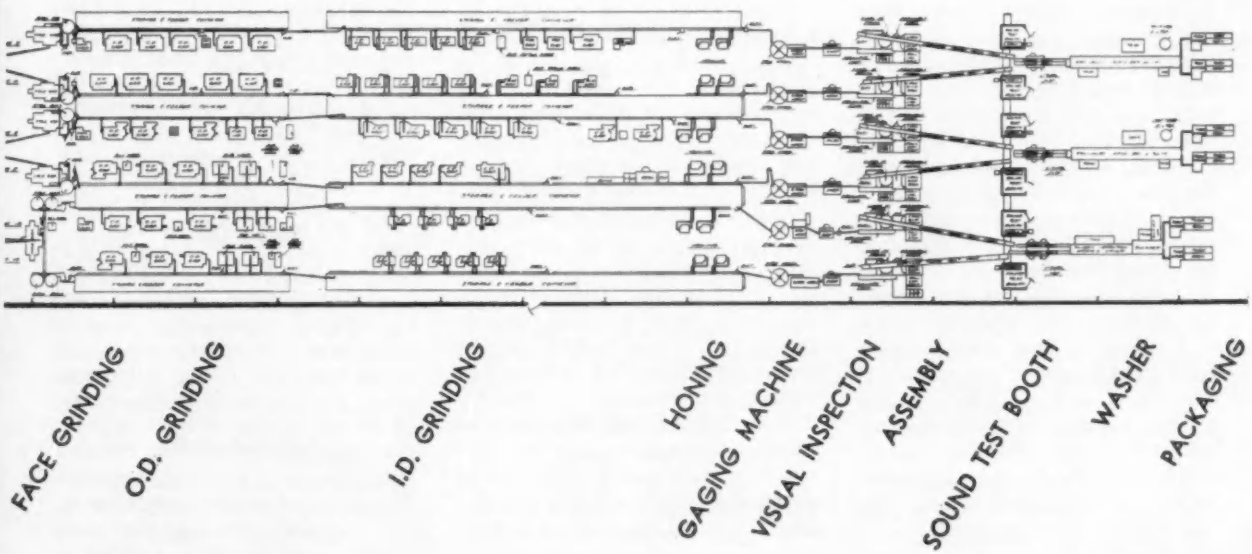
## Ingenious Operations and Handling Techniques Make Possible Production of Many Millions of Automotive Tapered Roller Bearings Yearly

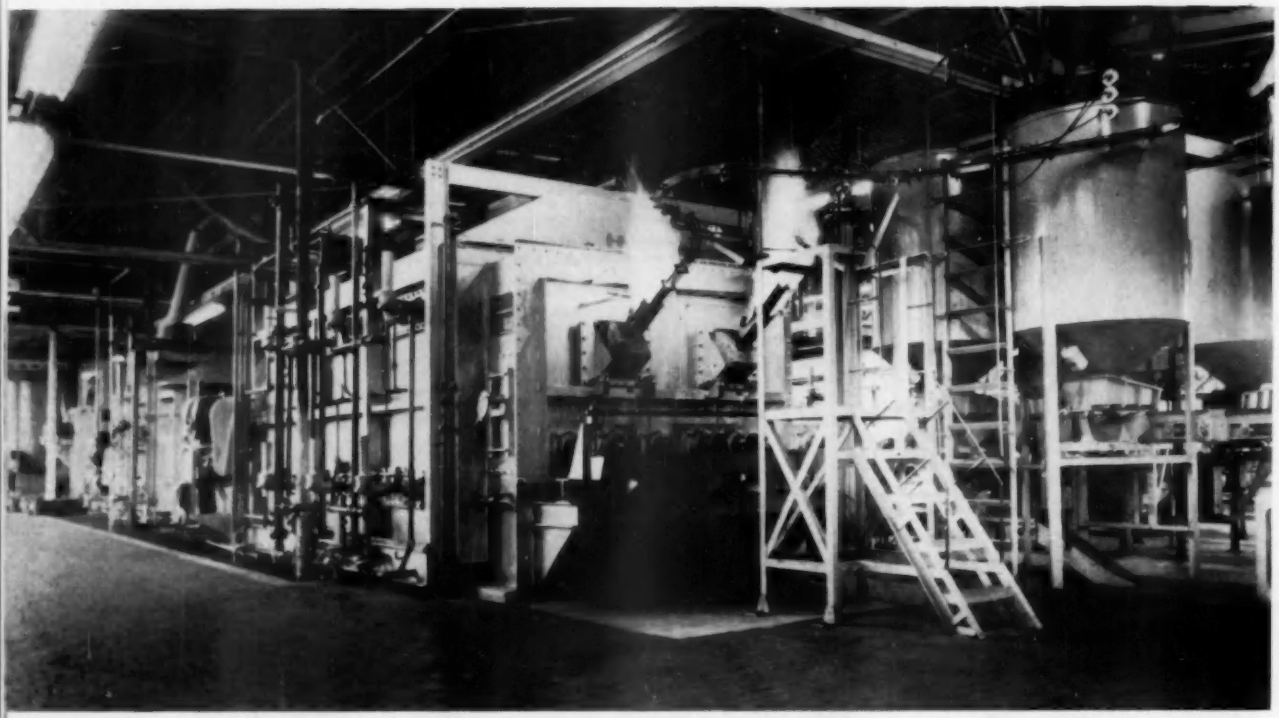
*On the right of the illustration are shown the batteries of Conomatics, making up five lines, used for the first operation of green machining cones from seamless tubing. At the left are the Conomatic chamfering machines and Minster marking presses. In the center of the picture an operator is checking cones on a Kodak contour projector.*

the screw machine stock rack, until the finished and wrapped product is placed in shipping cartons, practically all of the operations are performed automatically.

### Storage Banks

Incorporated in the production lines is a product storage or banking system, including bins, hoppers, spiral storage racks and rotary distributing conveyors, which provides a regular flow of materials to each of the operations at predetermined average rates. Each machine section is integrated, being inter-dependent upon machines preceding it in the production sequence. An interlock system provides flows at rates consistent with machine requirements. The interlock system, which operates by means of a series of limit switches and photo-electric cells, not only stops machine operation when the machine has run out of product for





*The cone heat treating department exemplifies the straight line methods in this highly mechanized plant. Cones are processed through carburizing, hardening and tempering furnaces. Oil quenching follows carburizing and hardening. Parts are carried between furnaces by spiral conveyors*

processing or when the machine itself is mal-functioning, but also when the product is being banked too fast for a subsequent operation in the line.

The heat-treating facilities are geared to handle product volume in seven days that is processed by other producing sections in five days, to avoid periodic undesirable shut-down of heat treating equipment. Two days' storage capacity of cups and cones between green machining and heat treating, and also between heat treating and grinding, is provided by bulk storage bins. Smaller bulk storage bins are located between the screw machines and stamping and chamfering operations. These bulk storage facilities have feeding and orienting devices which place the parts in a single line and properly positioned for the next operation.

Another link in the product banking system is the distributing conveyors in the finishing departments which feed parts directly into the grinding and honing machines. The parts move in a continuous circle above the machines, and as an opening in a machine chute occurs a part drops into place in the chute for that machine. These distributing conveyors were designed by Timken engineers.

## Machine Tools

All of the screw machines and most of the other equipment are of special designs or have special adaptations to custom-fit the application. Emphasis was placed on machines of minimum sizes, with short strokes, for faster cycle operation and saving of space. It was also decided to use single purpose screw machines and grinding machines. In addition, carbide tooling was adopted for the green machining of workpieces. It was found that cups on single spindle screw machines could be machined at speeds four times higher (on the order of 475 sfm) and at feeds two times faster than before. The result is that the new single spindle screw machines will produce eight times as many cups per hour as an old model single spindle machine and 2½ times as many as a four-spindle conventional automatic.

At the time the plant development was taking place, no screw machine had been built which would meet the requirements. The machine tool builders were consulted, and in a cooperative research and development program financed by Timken, the necessary equipment was evolved. An interesting sidelight is that the design of the carbide tooling on one of the new screw machines made it possible for the company to save 1/16-in. of tubing for each cup made. For one million cups, this represents a saving of almost one mile of tubing.

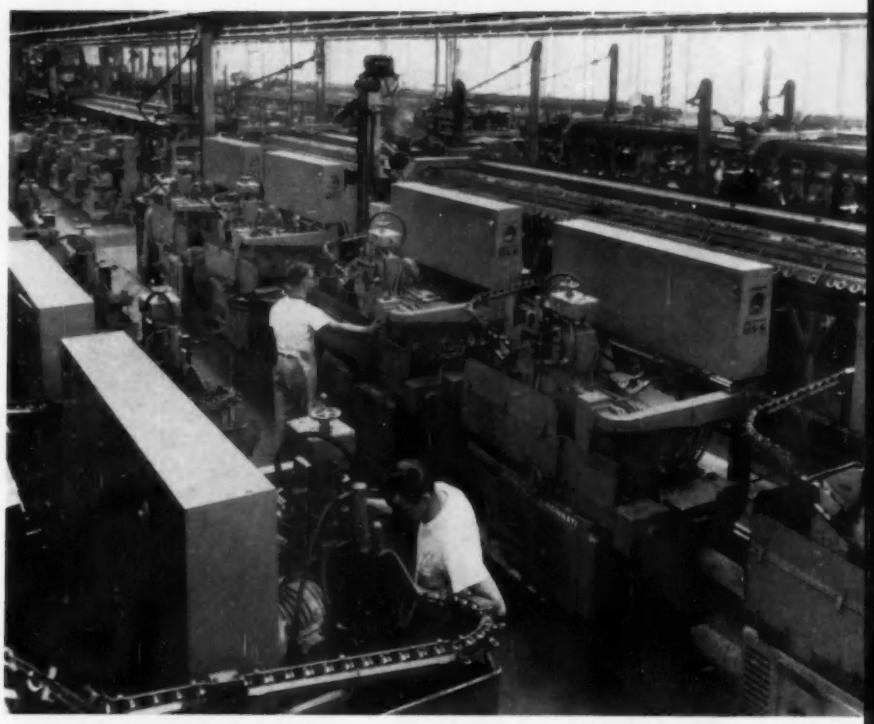
## Quality Control

The cup and cone lines also have a built-in quality control system. On critical operations, bearing parts leaving the machines are held in chutes until roving inspectors check the last piece in the chute. If the part checks within tolerance, the balance in the chute is released and conveyed to the next operation. Since elapsed time between operations is short, it is relatively easy to make changes if something is

wrong. For example, at the internal honing operation, if the ground finish is too rough and parts do not clean up in honing, a change can be quickly made in the grinding machines to correct the condition.

## Seamless Tubing

The material used in making the cups and cones is electric furnace, high-alloy steel tubing, SAE 4620 nickel, molybdenum, chromium carburizing grade, supplied by Timken's Steel and Tube Div. at Canton, Ohio. This seamless tubing is stored in bundles on racks located in an inside area adjacent to the green machining automatics. The racks hold a month's supply of tubing, segregated by diameter. A three-ton crane, designed by Timken and built by the Cleveland Tramrail Co., is used to handle the bundles of tubing. It can span the entire department laterally, as well as make 360-deg turns. Operator control of the crane is from an electric control box made available at floor level.



*General view of the cone finishing department. In the foreground are the Cincinnati Microcentric grinders which grind the tapered OD raceways of the cones. Note the rotary distributing conveyors above the banks of machines which feed cones into chutes leading to the machines.*

## Operational Sequence

In this first section of a two-part article, the sequence of operations on the *cone* line only will be described. Basically, the work operations consist of: (1) green machining, (2) chamfer and mark, (3) heat treating, (4) face grinding, (5) OD grinding, (6) ID grinding, (7) OD honing, (8) gaging and inspection, (9) assembly, (10) sound testing, and (11) wash, dry, preserve and package. All of these operations progress on a continuous basis from the feed of tubes into the green machining automatics, to final packaging.

The plant layout is in the form of a U turned 90 deg to the right. The bottom of the U can be mentally pictured as being the left-hand side and starting point of the operations. And the legs of the U, leading off to the right, as being the separate cup and cone lines.

## Green Machining

Green machining of the cones is by five batteries of Conomatics which comprise four 1½-in. and twelve 2⅝-in. machines. The green machining operation consists of turning, from seamless tubing, the bores and tapered raceways of the cones, prior to heat treatment. The stock racks which feed these machines are loaded by lift truck or crane, and hold about an eight-hours' supply of tubing. The racks are of special Timken design. Tubing is positioned in the machines from the stock racks. When out of stock, the machine stops with loading ram retracted and collet open. The machine operator removes the butt end and by pressing an air valve control the loading cradle is opened, a new piece of tubing rolls into the cradle, the cradle closes, and a ram pushes the tubing into the spindle until it hits a stop. Chucking of the tubing is automatic.

## Machine Design

It will be of interest, at this point, to mention some of the factors which entered into the special design of the screw machines.

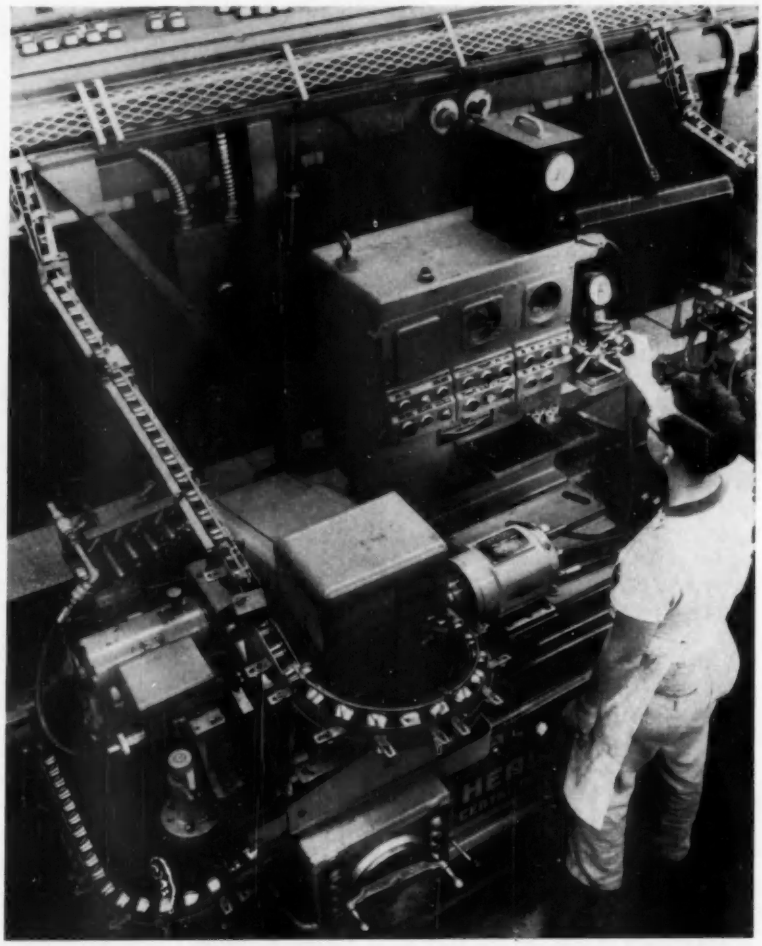
The relative advantages of using hot rolled or cold finished tubing were carefully considered. The cold finishing operation produces tubes to close dimensions, but costs about two to four dollars extra per tube. On the other hand, the lower-cost hot rolled tubes, as rolled, may have OD's varying from tube to tube by as much as 0.060 in. Usually, therefore, when hot rolled tubes are chucked in the spindle the collet tension must be adjusted. Hand chucking, however, did not coincide with the Bucyrus premise of automatic operation. The solution to this problem involved the working out of chucking devices incorporating Belleville springs which give constant chucking pressure over the range of hot rolled tube tolerances. The automatics at Timken, as a result, handle hot rolled tube stock automatically from tube to tube, with no hand chucking or collet adjustment.

Tool assemblies are interchangeable, provision having been made for tool adjustment in the holders. Carbide tooling is pre-ground and

pre-set in tool holders, ready for quick installation on machines. All of the screw machines have double adjustments. Besides adjustments provided in the tool holders, the slides are adjustable to obtain size on a new part being set up. Thereafter, tools may be changed with no further machine adjustment, considerably reducing downtime for tool changes. A "preventive maintenance" schedule, based upon operating experience, is followed in the renewal of all cutting tools. Machines in whole are likewise taken from the line and overhauled at periodic intervals. This work is done in a separate, well-equipped tool room and maintenance department.

Improvement in the cutting off of tubing with carbide tools was obtained by using two cut-off tools working simultaneously. The first narrow tool cuts a single chip, while the second, a wider tool, cuts two narrow chips. This arrangement, designed by Timken, gives free flow of chips out of the cut-off slot, and prevents wedging of chips against the sides of the slot, a prior source of serious tool damage.

A unique hydraulic system which has given the single spindle automatics an added productivity of as much as 30 per cent, was also specially designed into the machines. Four slides operate off the machine's camshaft: end working slide carrying boring and turning tools, forming slide carrying two radius tools, breakdown slide carrying the breakdown tool, and cut-off slide carrying the cut-off tool. These tools all work simultaneously until just before the cut-off tool completes the cutting cycle. At the desired time before final cut-off, the hydraulic system quickly removes the end working tool slide and re-engages it with camming for the next cycle. Formerly, as much as one-third of the cycle time was consumed in returning the end working slide to its new starting position.



***Heald 190 Centri-Matics grind the ID of cones to a tolerance of 0.0005 to 0.0008-in. according to the quality ordered. Cycle time varies from 14 to 25 sec per cone depending upon cone size. The gage mounted on machine permits quick checks of tolerances.***

## Coolant and Chip System

The Timken-designed system for handling coolants and disposing of chips from the green machining department is also unique. Openings in the machine bases directly beneath the spindles allow coolants and chips to fall directly into an underfloor sluiceway. Chips and coolant are separated, the coolant being recirculated into the coolant system while the chips are strained out and automatically conveyed by means of a series of spiral and vibratory conveyors into truck trailers for return to Timken's Canton steel mill, where they are remelted.

Part of this chip and coolant handling system is an interesting pick-off device which prevents the products from falling into the openings in the machine bases. When machining of the part has been completed, a pick-off pin catches the processed piece and places it on the conveyor leading to the stamping and chamfering operations. A limit switch and lever detect the presence or absence of a workpiece in the discharge chute at the proper time in the cycle. If, for any reason, the piece is not present, the machine automatically stops. It is said that the development of this pick-off unit was a keystone in the interlock system because it insures proper release of parts from the automatics.

## Chamfering

To continue with the work oper-

ations — following the green machining operation, the bores of the cones are chamfered, and the large-end faces of the cones are stamped, or marked, with product identification. The machines used for this purpose are interspersed Conomatics and Minster presses, six of the former and five of the latter for respectively chamfering and stamping.

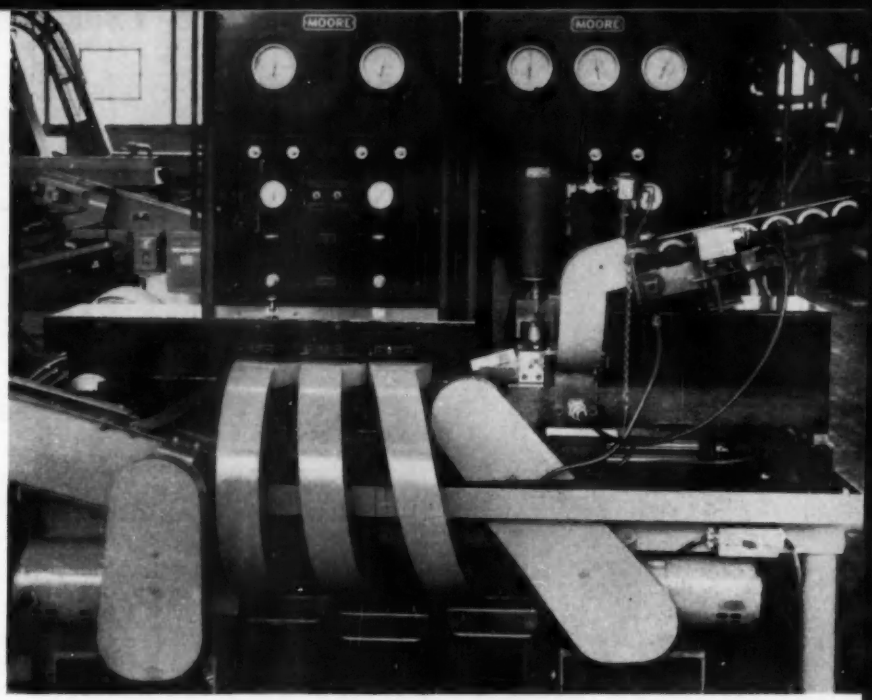
## Heat Treatment

Cones are then conveyed to the heat treating operation, where they are processed through carburizing, hardening and tempering furnaces. To carry out the automatic through-flow principle, it was necessary to develop new heat treating equipment. This was done in cooperation with Surface Combustion Co. The first unit is a spiral retort carburizing furnace using a carburizing atmosphere of endothermic gas and natural gas maintained in the retort at a slightly positive pressure. The carburizing temperature is 1700 F and the cycle time from 5½ to 8 hours. The resulting carburized case ranges in depth from about 0.025 to 0.040 in. Maximum surface carbon is one per cent, graduating progressively downward to a core carbon of about 0.2 per cent.

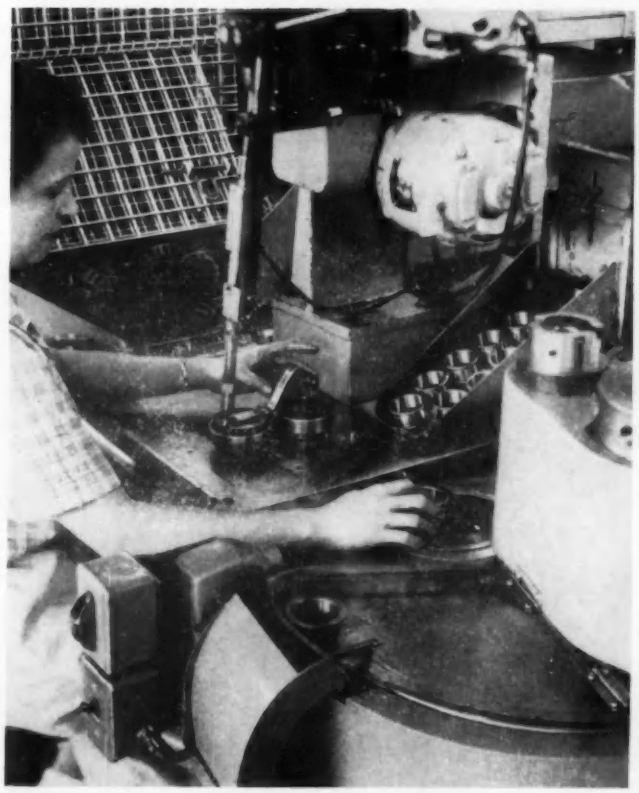
The cones are carried by spiral conveyor from the carburizing furnace into a sealed oil quench, where they are picked up by another spiral conveyor which takes them through a washer to remove excess oil. From the washer the parts are mechanically fed into the re-heat furnace for case refinement. The re-heat furnace has endothermic gas atmosphere, and operates at 1510 F. Here the parts are brought up to furnace temperature, followed by quenching in oil. Cones are then carried through a washer and into a final tempering operation working at 360 F.

Three groups of heat treating furnaces are used to supply the cone lines. Only two attendants and an operator are needed to han-

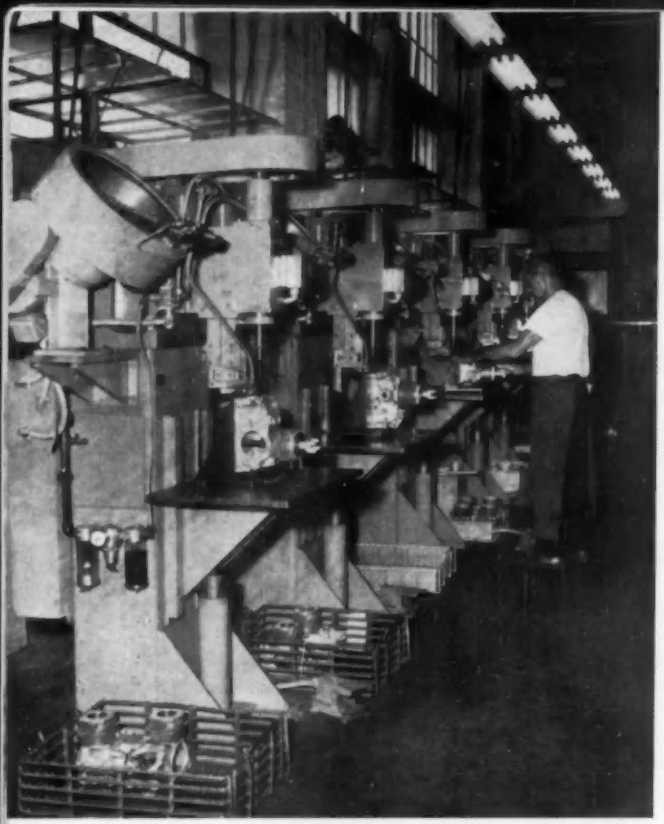
*(Turn to page 126, please)*




***Moore automatic gage simultaneously measures the cone's overall length, OD, raceway stand, taper, rib length and bore. Cones which are off-tolerance are segregated into four individual baskets according to gaged measurements. This gage can inspect 42 cones per minute.***



***Station where operator assembles cones, rollers and cages. Magnetic elevator brings the rollers into the feed tube that places rollers into the cage. When a cage is filled, the assembly is put into the closing-in press at right. An electric eye beam, when broken by hand of operator, sets and trips the press. Finished cone assemblies are ejected into a conveyor.***



*A bank of machines used for inserting steel inserts into aluminum engine block castings for the placement of threaded studs.*

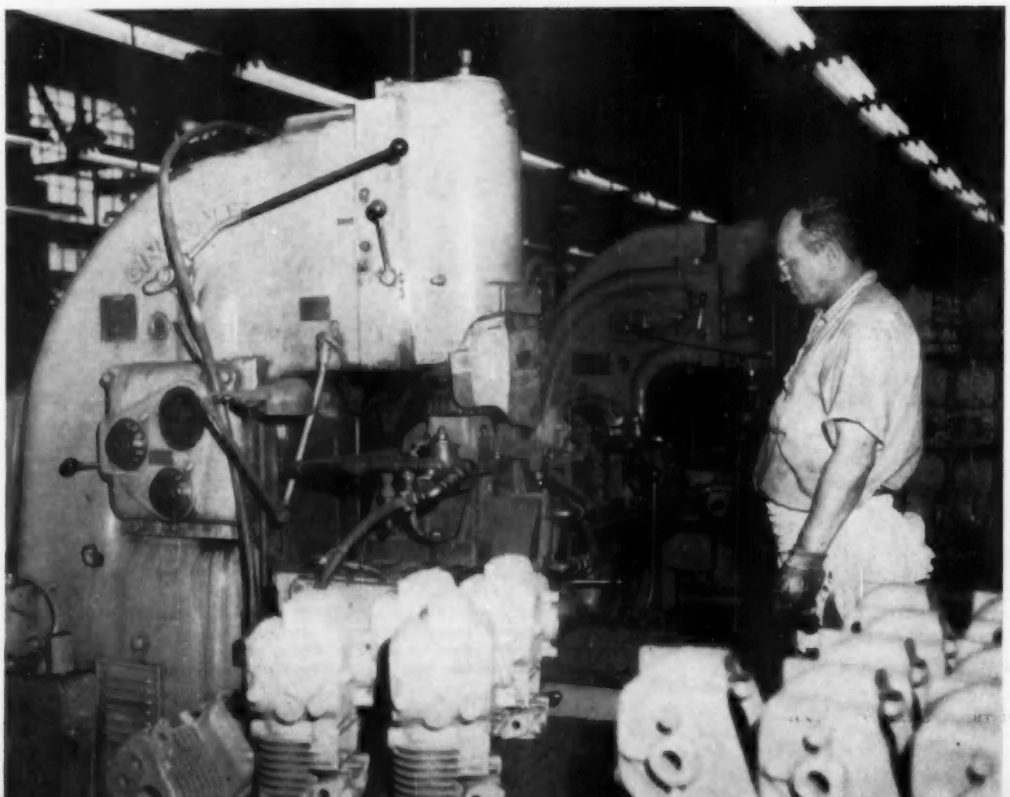
# Standardized Military Engines

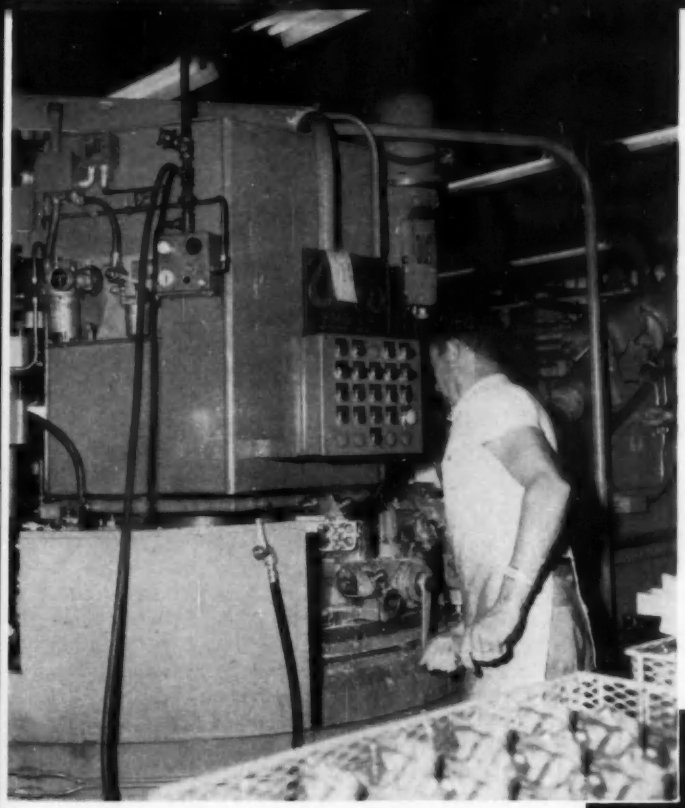
THE group of illustrations shown here represents sampling of operations previewed at the Continental Motors Corp., Kercheval plant during the military inspection tour held recently. The tour, held under the auspices of the U. S. Corps of Engineers, signalized the beginning of production of the standardized small military engines developed cooperatively and placed in production by Continental. One of the noteworthy features of the Kercheval plant is that most of the manufacturing equipment can be used in the making of commercial as well as military engines.

According to information available at the time, Continental has been authorized to produce 1000 engines each of three basic sizes in the program. These 3000 engines, as completed, will be distributed by the Corps of Engineers for intensive testing by the various military services.

## Small Units in Three Basic Sizes Go Into Production at

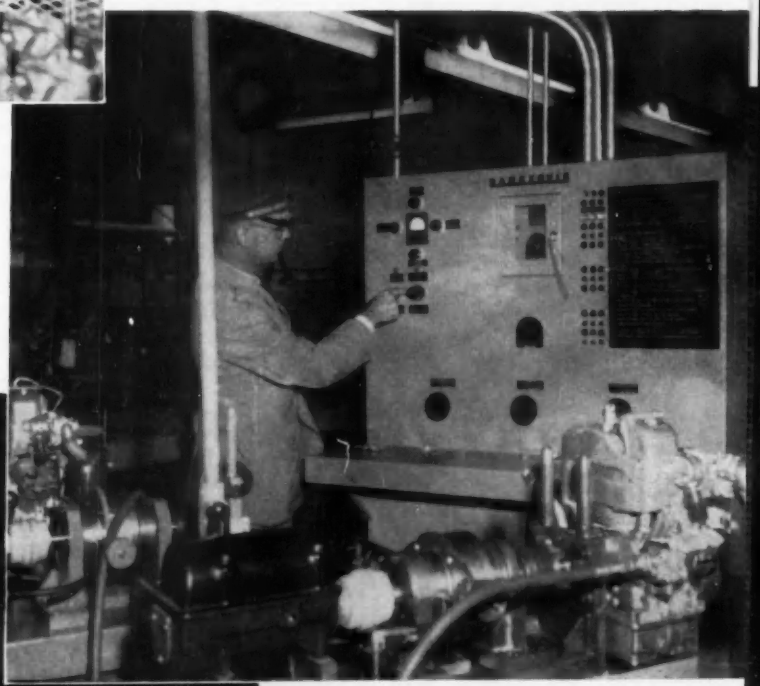
*Milling of cylinder blocks is a typical example of machining operations involved in the production of these engines.*



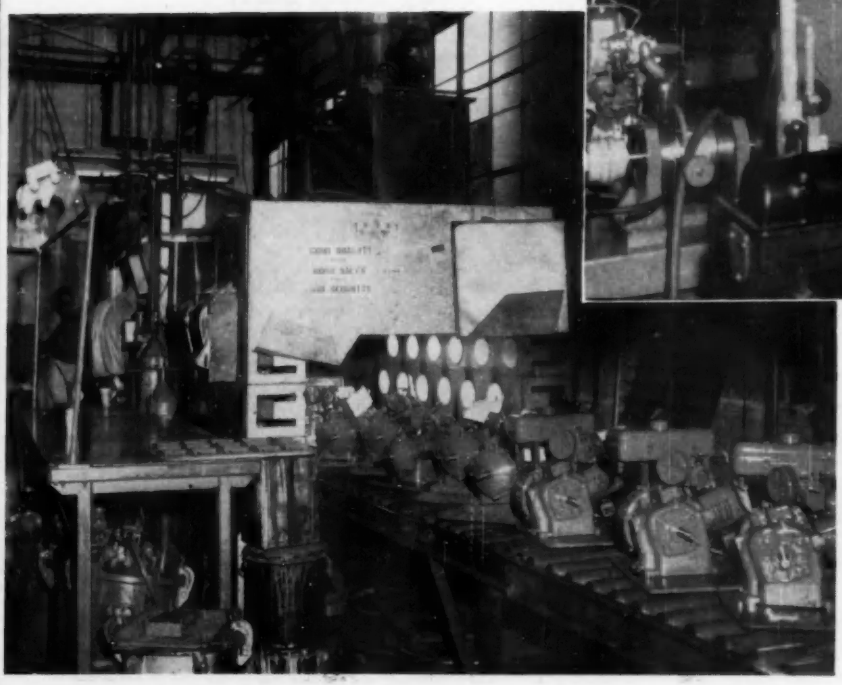


*One of the many machining operations in the production of standard military engines in Continental's Kercheval Ave. plant in Detroit.*

*Engines are tested on a Nankervis test panel before shipment. Here a representative of the Office Chief of Engineers, Washington, D. C., examines the equipment.*



## Continental Motors Kercheval Plant



*Completed Continental gasoline engines rolling off the assembly line, just after painting operations, ready for packaging and shipment. These engines are for commercial use and are not the standard military models.*

# Farnborough Air Show Reveals British Missiles and Rockets

THE 18th Farnborough Air Show, staged early in September by the Society of British Aircraft Constructors, reflected the recent shift in Britain's defense policy from piloted to guided weapons, and an intensified export drive with a new concentration on missiles and commercial craft. Efforts are being made to match the 1956 record of overseas sales valued at $293 million, although the shift away from manned military aircraft upset the production schedules of a number of manufacturers.

However, these changes did not find the industry unprepared, and Britain's traditional security-mindedness and caution bowed to sales promotion at Farnborough, which this year featured a display of guided missiles and rocket engines claimed to be the largest and most varied yet shown in public. Over 400 British companies, it was disclosed, are at present concerned with the manufacture of this equipment.

Armstrong Whitworth for the first time exhibited its ship-to-air Seaslug developed jointly with General Electric and Sperry for the Royal Navy. This has four sets of three launching and accelerating rockets, wrapped around the forward end of the cylindrical body and jettisoned after supersonic speed is reached. Propulsion is sustained by an internal motor, believed to be of the solid fuel type. Aiming, firing and guidance are controlled by the ship's radar, and there is automatic compensation for roll and pitch of the vessel.

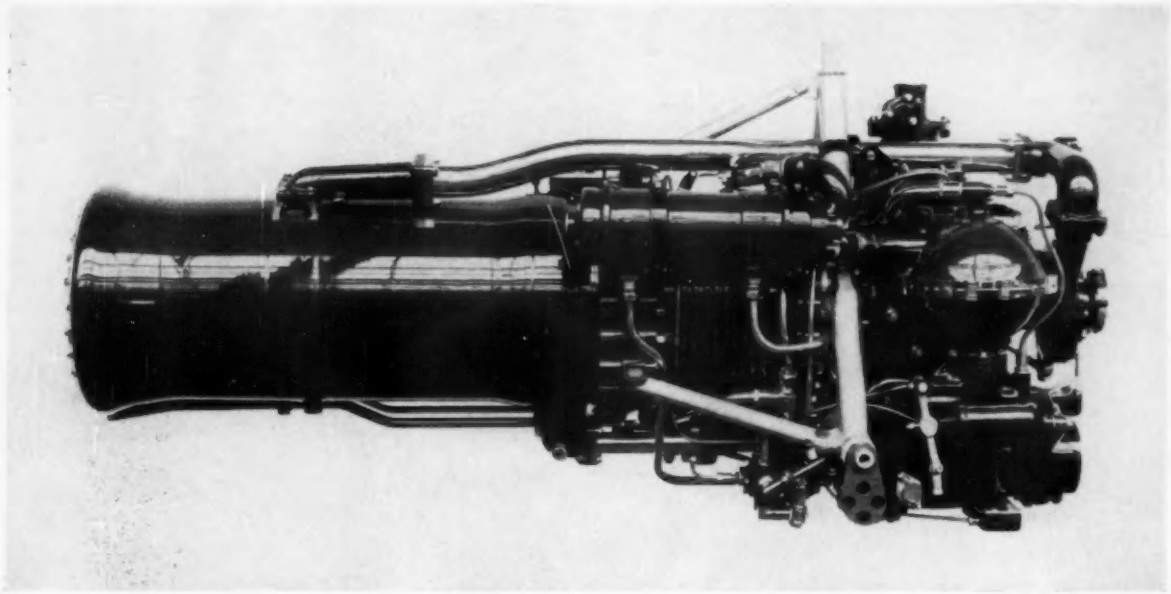
De Havilland revealed the air-launched Firestreak, which is guided by infra-red radiation from the target's engines. After release from the fighter, it is propelled by an internal solid-fuel rocket which gives a high thrust of short duration. Britain's newest all-weather twin-engined fighters—the English Electric P1, Gloster Javelin and de Havilland Sea Vixen—will be armed with this weapon.

Another missile making its public debut was the English Electric Thunderbird, and during the Show it was announced that this ground-to-air unit has now been ordered by the Royal Air Force as well as by the Army. It has a cluster of four large wrap-around rockets and a powder rocket main motor. Guidance is by radar.

Bristol unveiled its ground-to-air Bloodhound, Britain's most advanced missile of its kind, which is now in production for the R.A.F. and will ultimately replace manned fighters. Launched by

**By David Scott**

*Bristol Bloodhound is powered by two Thor ramjet engines and launched by booster rockets. Guidance is by ground radar.*



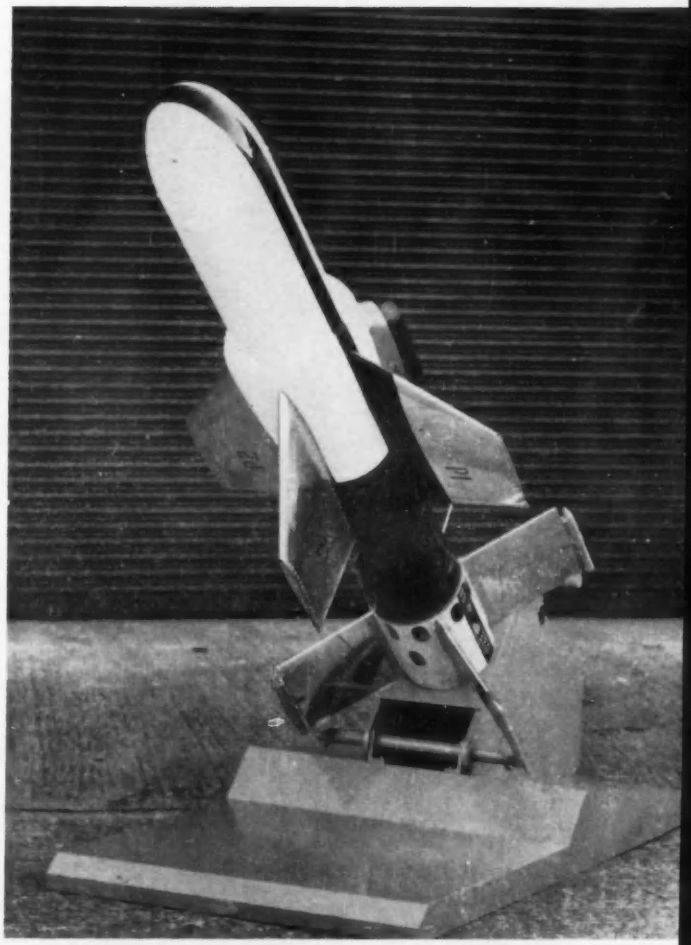
*The de Havilland Spectre is Britain's first rocket engine used in manned aircraft and capable of controlled variable thrust.*

booster rockets, it is self-powered by a pair of kerosene-burning Thor ramjets which are understood to develop some 15,000 lb thrust at Mach 3 at sea level. The guidance system, developed by Ferranti, uses homing on reflection from the target, which is illuminated by ground radar. The body is 22 ft 2 in. long and 1 ft 9 in. in diameter, and has a span of 9 ft 3 in. across the stabilizing fins.

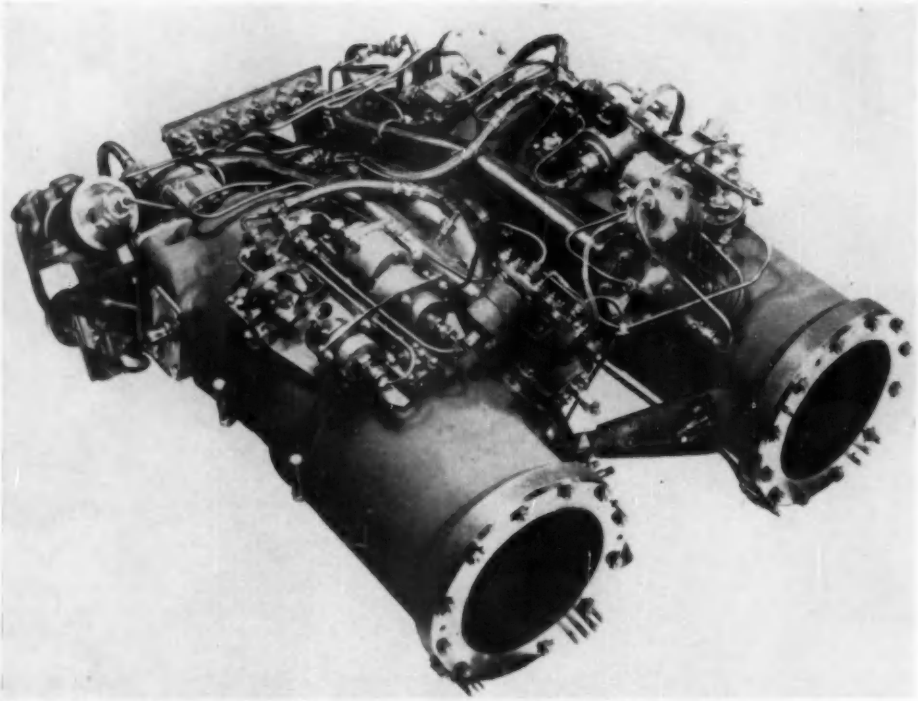
The disclosure by Short Bros. & Harland of a multi-purpose surface-to-air test vehicle indicated that they have been working on guided missiles for some time. Intended for visual aiming with radio control, it has a flare in each of the four tail fins. Propulsion is by eight booster motors released after burn-out, and by a solid fuel sustainer motor. Another unannounced display was a mock-up of the Vickers 888 air-to-air missile; details unavailable.

Among the rocket engines seen at Farnborough was the Double Scorpion presented by Napier. An Olympus-powered Canberra bomber fitted with this booster unit recently set up a new world aircraft altitude record of 70,000 ft. This twin-chamber power-pack uses high test peroxide for its oxidant and burns normal kerosene or gasoline. The peroxide is employed as a coolant for the combustion chamber before it is passed through a catalyst which decomposes it into free oxygen and superheated steam. This creates the correct temperature and pressure conditions for spontaneous combustion when it is mixed with fuel. No ignitor is needed, and the unit can be repeatedly stopped and started at any height. Chambers are individually controllable, and total thrust is estimated to be 8000 lb at sea level.

Relaxed security regulations permitted the display of the de Havilland Spectre, Britain's first vari-



*The Short multi-purpose surface-to-air test vehicle, designed to intercept low-flying aircraft, is radio-controlled*



*Napier Double Scorpion twin-rocket engine has individually-controllable chambers and develops a total thrust believed to be 800 lb at sea level.*

able-thrust rocket motor to go into production. A bi-propellant unit using kerosene and high-test hydrogen peroxide, it is integrally constructed with all pumps, valves and controls in one compact assembly. The main cylindrical structure contains the turbine for driving the propellant pumps, the catalyst chamber and the combustion chamber. This small high-speed turbine is energized by a separate supply of hydrogen peroxide, and decomposition products from the propellant pumps are subsequently directed through the main combustion chamber. The Spectre has a maximum thrust of about 8000 lb, and is 56½ in. long and 32 in. in diameter including mounting brackets. It has so far been installed in the Saunders-Roe SR-53 mixed-power research interceptor, and experimentally in a Canberra.

In the engine section Bristol displayed the Orion statically for the first time. This supercharged turboprop, with a take-off rating of 5150 effective hp, is claimed to have an extremely high ratio of cruising power to weight. At 390 mph and 30,000 ft it delivers 3960 eph for a gross weight of only 3200 lb. It will power the Canadair CL 44, and is on order for the Royal Canadian Air Force and for later versions of the Bristol Britannia.

De Havilland exhibited and released further structural details of the Gyron D.Gy.2 turbojet, which is now rated at 20,000 lb static thrust. Featuring design simplicity, the single-shaft rotor is carried on only two main bearings, and consists of a seven-stage compressor, an annular combustion chamber with 17 burners, and a two-stage turbine.

Armstrong Siddeley revealed two new shaft turbines in model form, both rated at about 1000 hp. The P.181 is intended for helicopters and the P.182 for fixed-wing craft. Both use the same two-stage centrifugal compressor driven by a two-stage turbine, and a single-stage power turbine driving the output shaft. Differences are mainly in the reduction gear-

*Powered by a Napier Gazelle the prototype Westland Wessex is claimed to be the first helicopter using a free-turbine engine. It is under development for the Royal Navy.*

*Armstrong Whitworth ship-to-air Seaslug developed for the British Navy. A solid-fuel internal motor sustains flight after the rockets are jettisoned.*

ing and final drives. The engines weigh 425 lb, have a diameter of 30 in., and overall lengths are 85 in. for the P.181 and 81 in. for the P.182.

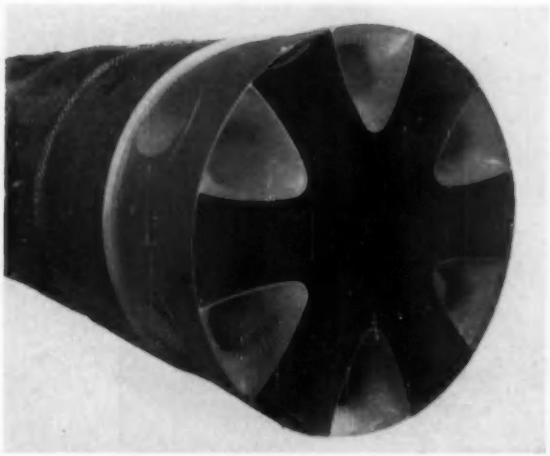
Rolls-Royce exhibits included noise-suppressing nozzles fitted to the jet pipes of the four Avon R.A.29 engines on the Comet 3 which was displayed and flown at Farnborough. Claimed to give a four-decibel reduction of the peak noise heard on the ground, these silencers consist of simple tubular extensions with six hollow corrugations extending inwards by about half the radius of the tail pipe. These, together with air flow through the corrugations, break the exhaust up into a great number of small portions which are diffused into a large area. Loss of thrust is stated to be negligible, and the extra weight is only 35 lb per engine. The design was developed in collaboration with Boeing, with which Rolls-Royce has an agreement to exchange information on jet noise and its suppression.

Another Rolls-Royce display was a full-scale working model of the thrust-reversal unit which was also effectively flight-demonstrated on a Hawker Hunter. Housed in the jet pipe, it consists of a pair of eyelid shutters that are closed by a hydraulic ram to seal off the tail and deflect the exhaust outwards and forwards through square openings on either side. This equipment will be fitted to the Avon engines on the Comet 4, and a similar arrangement is to be used on the Conway engines in the Boeing 707 airliner. The by-pass Conway, flown experimentally in an Avro Vulcan bomber at the Show, has a civil rating of 16,500 lb thrust. It is destined for military service at 18,000 lb thrust in the Handley Page Victor 2 bomber.

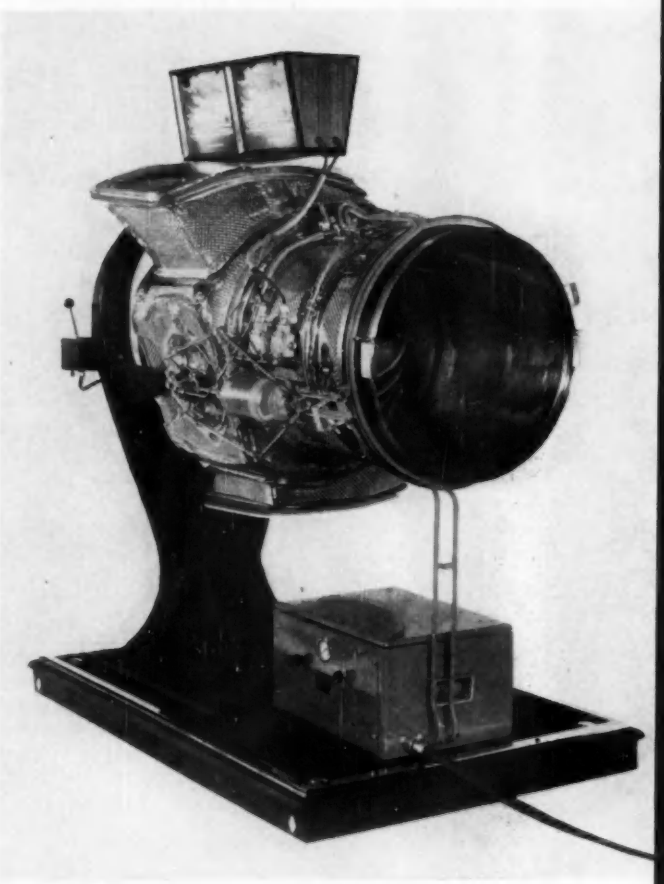
One of Britain's most advanced aircraft, seen at Farnborough for the first time, was the Saunders-Roe SR-53 interceptor, which has an Armstrong Siddeley Viper turbojet carried above a Spectre rocket motor in the stepped tail of the fuselage. Although the performance was limited by the small number of flight hours so far completed, this experimental craft is said to be capable of vertical climbs at supersonic speeds to great altitudes.

A last-minute ban by the Ministry of Supply on sonic bangs ruled out any full display of the capabilities of the English Electric P.1, the U.K.'s last land-based fighter in view of the dominance of guided missiles in its new air defense program. Both the P.1A and P.1B were on show, the latter version being powered by a pair of vertically stacked Rolls-Royce Avon turbojets with reheat, giving a combined thrust of 29,000 lb. Even without boost the P.1B is believed to have a power-weight ratio of close to 1 to 1, and to be capable of some 1500 mph in a climb.

Demonstrated also was the latest naval strike fighter, the Vickers Supermarine Scimitar—formerly designated N.113. Powered by a pair of Rolls-Royce Avons, it uses the blown-flap system for high lift, whereby air bled from each engine compressor is ducted through spanwise slots onto the upper surface of the wing flaps. With a 37 ft 2 in.-span and 55 ft 4 in.-length, the Scimitar is the largest production single-seat jet ever made in Britain. (*Cont'd*)



*Rolls-Royce noise suppression unit is only 35 lb heavier than the conventional tail pipe. It was demonstrated on the Avon engines of the Comet 3 flown at Farnborough.*



*Rolls-Royce thrust reversal units will be fitted to the Comet 4 and to the Conway engines of the Boeing 707 airliner.*

The Short SC.1 VTOL research aircraft was not shown at Farnborough, reportedly because of initial technical difficulties not yet ironed out. This unusual delta-winged plane incorporates five Rolls-Royce RB.108 turbojets, one of which provides forward propulsion and the remainder downward thrust for vertical lift.

Miles presented the M.100 Student, claimed to be the first jet trainer to be designed as such from scratch. It is powered by an 880-lb thrust Blackburn-Turbomeca Marbore II, located in the top of the fuselage behind the cockpit for safety. Other unusual features include two-abreast seating, wide, car-type doors for easy entry and bale-out, and a protective keel. Another Miles exhibit was the HDM.105 Aerovan, which was publicly displayed for the first time at the Paris Air Show in May (see AI July 1, 1957).

Britain's newest bid for the DC-3 replacement is the Aviation Traders Accountant, which had its initial flight in July and public showing at Farnborough. This 28-passenger medium-range transport has a pair of Rolls-Royce Dart turboprops carried in nacelles above the low wing. Cruising speed is 295 mph, service ceiling 33,000 ft, and maximum stage 2420 miles. Two pre-production models of the basic version are now under construction, and future plans call for an executive-type 12-passenger and a freighter.

Outstanding among the large display of Westland helicopters was the prototype Wessex, which is claimed to be the world's first machine of its type powered by a free-turbine engine. The airframe is a modified American Sikorsky S.58 and the turbine a de-rated Napier Gazelle that produces 1100 shaft hp. The absence of mechanical drive between engine and rotor makes a clutch unnecessary, thus simplifying starting and reducing fatigue of the transmission. The power plant also minimizes vibration and noise. Developed for the Royal Navy, the Wessex has a maximum sea-level speed of 120 knots, a hover ceiling of 7000 ft, and a range of 340 nautical miles. A completely Westland-built turbocopter with a Gazelle delivering 1450 shp is scheduled to fly next year.

An unusual exhibit in the automotive field was the Harrier folding car, designed for airlift operations by Hunting Percival, who build the Pembroke military transport. The four-seat vehicle is powered by a rear-mounted 40 cu in. twin-cylinder motorcycle engine, and has a central girder chassis frame with all-independent springing using parallel links and telescopic suspension units. The body consists of two sheet metal boxes hinged to the chassis member.

For collapsing, the jointed steering column is swung down, seats are stowed and the two box halves folded inwards and secured, suspension units are dislocated by withdrawing pull-out pins, and wheels on their parallel links are raised and enclosed in metal covers. In this form the entire assembly has a volume of only 33 cu ft, less than one-tenth that of a conventional quarter-ton truck, and weighs 700 lb. It can be lifted by its crew of four, and unloaded from the aircraft and made ready for use by the same men in one minute.

# Evaporative Cooling System for Electronic Components

THE Martin Co. has announced development of an airborne evaporative cooling system to protect electronic equipment inside aircraft or missiles from temperatures up to the 800 F of Mach 5 flight.

While much effort has gone into the development of high temperature electronic component parts, few are currently available that can withstand temperatures above 125 C. Therefore, the provision of adequate cooling for electronic component parts during high speed flight remains a major consideration. Up until now, ram-air or refrigerated air systems have been generally used to accomplish this end.

### Martin Evaporative Method

Concept of the self-contained system is depicted in Fig. 1. At the bottom is a conventional electronic chassis with tubes or transformers projecting from the surface and components of various other types in the lower portion of the chassis. Mating mechanically with this chassis is a container carrying water used as the evaporant fluid; around each of the tubes is a recess.

High heat transfer is obtained by direct contact between the surface of the tube and the fluid. The heat first passes through a finger-type material which is wrapped around the tube to provide metallic contact between the surface and the inside of the shell. It then goes through the shell to the boiling heat transfer coefficient on the outside of the shell.

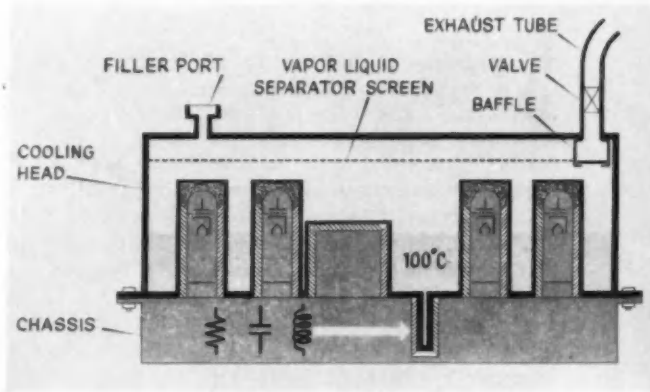
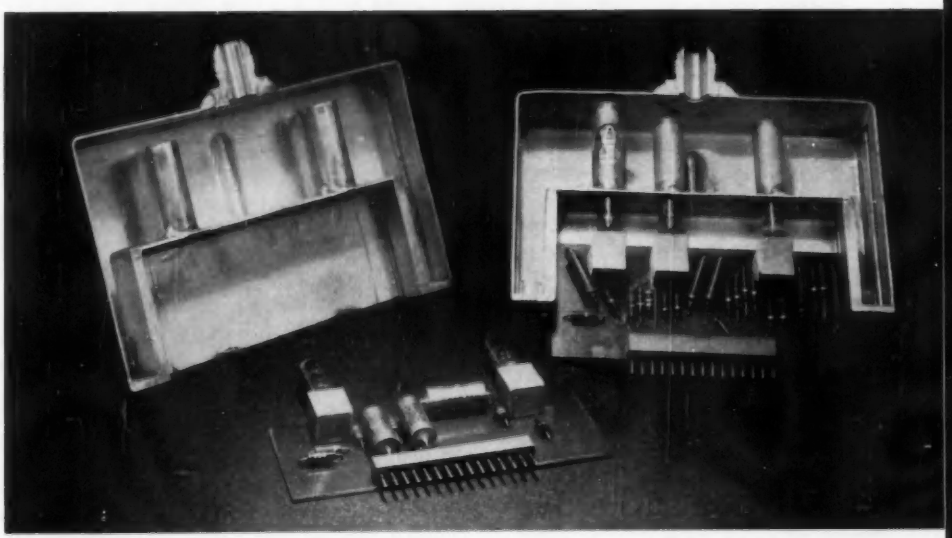



*FIG. 1—Concept of Martin evaporative system for cooling of electronic equipment in aircraft and missiles. Basic advantage claimed is location of heat sink close to heat source with highly efficient heat transfer through conduction.*

Steam escapes through a filler port and a vent. A

(*Turn to page* 116, *please*)



***Lightweight and compact cooling jacket is included in the Martin evaporative system. Water in the outer cavity surrounds the heat-generating components. Printed circuit cards, inserted through the bottom, seat in channels in the jacket's inner wall. The tubes fit into the cylindrical shells, and heat is conducted from them to the water through finger material (showing through cutaway portion of tube cylinder).***

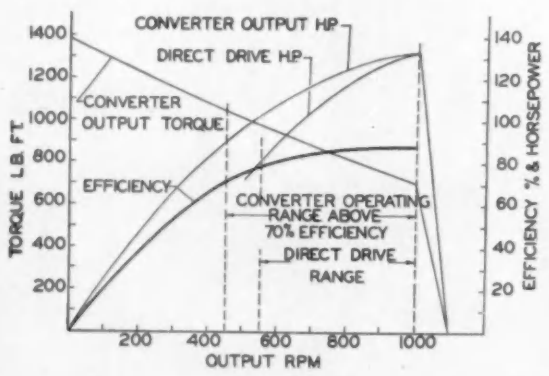
# SAE

## Holds National Farm, Construction,

MEMBERS of the Society of Automotive Engineers, attending the National Farm, Construction, and Industrial Machinery meeting in Milwaukee Sept. 9-12, heard discussions of the hydraulic system and other components of the tractor. Design and analysis studies were also reported.

In his paper, "Torque Converting the Farm Tractor," E. E. Eaton, Clark Equipment Co., pointed out that the number of gear ratios on farm tractors has increased steadily in recent years, indicating that the theoretical perfection of an infinite number of gear ratios was being sought. While the torque converter is not a substitute for most existing gear ratios, it is a valuable supplement to them. It increases the amount of work that can be done in each gear, reduces gear shifting, and prevents engine slowdown. It increases the price tag of the tractor, will increase fuel consumption, and will not permit reduction of engine horsepower, but maintenance cost will be less, and more work can be done in a day. A cooler or heat exchanger is necessary. It permits the use of an output shaft governor to maintain a predetermined ground speed, under varying load demands, for a compatible gear ratio.

What makes the torque converter desirable in a shovel, dragline, or crane, that does not have a shift transmission box? F. J. Strnad, Link-Belt Speeder Corp., noted that the basic machinery of the shovel-crane is slow speed, high torque type, though giving way in the smaller sizes to lighter, higher speed designs. Compared to direct drive, the torque converter provides additional power into machinery, increasing productive capacity. It makes available greater sustained torque or line pull for operations requiring extra force. Shock loading of machinery is drastically reduced, resulting in longer life of equipment. Engine operation is channeled to the efficient speed range, important in the usual fixed throttle bucket operation. It assists use of modern high speed engines in equipment of inherently slow speed nature. The engine will not stall due to load. It provides the ability to control heavy crane loads entirely with the throttle for safe and precise spotting, giving a smoothness and ease of control far surpassing that obtained by slipping friction clutches and brakes. In many operations, greater fuel economy results, particularly with output shaft governor equipped machines in bucket work.




ENGINE–CONVERTER OUTPUT EFFICIENCY

In "Tractor Hydraulics, Good Field, No Hit," G. L. Hershman, International Harvester Co., described the hydraulic systems developed for tractors, beginning with the simple, basic types. The blocked return line system, simple in design, low in cost, but effective for minor control operations; blocked pump inlet system, low in cost, but suitable for some operations; and the basic open center system, usable with single or double acting cylinders, and with finer control, are the basic types. Advanced stage systems included the open center valve system, closed center valve system, and accumulator type central system.

The use of stress analysis in design of equipment was discussed in papers by William P. Macarus and LeRoy A. Grotto, of International Harvester Co.; D. J. Ward, of Allis-Chalmers Mfg. Co.; and E. J. Eckert, Caterpillar Tractor Co. The first dealt with experimental methods used in designing a motor scraper. Extensive use of stresscoat and strain gages to analyze dynamic loads in a prototype scraper at the proving grounds showed that highest stresses resulted from highspeed operation of the empty scraper over rough terrain. Building a test track with furrows 10 in. deep, and operating the test scraper over it while a car with strain gage recording equipment ran alongside over a smooth path showed that the gooseneck connection to the octagonal section, draft frame arm connection to the octagonal section, and the upper and lower connecting plates were high stress areas, the last the highest. Design changes were made to strengthen these areas, and a second prototype was built. Tests with this indicated that other areas, such

By Kenneth Rose

# and Industrial Machinery Meeting

as the connection of the gooseneck to the spindle, were now too high. Flexibility was needed in the structure also. A third prototype involved extending the gooseneck, tapering the upper and lower plates to minimize section change, and extending the vertical side plates to tie into the octagonal section. Results showed this design to be satisfactory, with overall stresses about 30 percent lower than in the original design.

Use of SR-4 gages and stresscoat was described by D. J. Ward in studies of a bulldozer "C" frame under test. A camera recorded strain gage readings, and an oscilloscope was used for high frequency dynamic loads or impact loads. The same techniques were reported by E. J. Eckert in studies of tractor rear axle, rear wheel, track link, and engine rocker arm. Fatigue tests on the axle indicated that the optimum hardness range was Rc 50-55, and straightening the axles slightly decreased fatigue strength. It was also found that stringers of nonmetallic inclusions at the surface definitely weaken the axle, shot peening increases fatigue strength, and machining a full radius at the root of the spline increases fatigue strength.

In spite of all automatic controls, and automatic production systems known as automation, consideration for the human operator is a necessity in the design of equipment, H. J. Bond, The Rand Corp., told the group. Machines, even automatic ones, wear out and break down, and the more complicated they are, the greater the maintenance problem. Some of what is now termed automation is really remote control, with human operators monitoring the system. There will always be a class of machines, such as automobiles, aircraft, and recreational equipment, that will be operated by humans. Human consideration should not be left to the last phase of equipment design.

A study of 60 farm tractors was reported by J. A. Weber, asst. professor of agricultural engineering, University of Illinois, with recommendations to improve maintenance. His suggestions were to eliminate as many maintenance chores as possible by design, and to make the remainder as simple as possible. Accessibility was one suggestion. Present recommendations should be re-examined to make sure time intervals are realistic, and that the manuals themselves are properly written.

At the Production Forum, the session upon heat treating produced a discussion of high temperature carburizing, with reports by users of the process. Increasing the temperature of gas carburizing from 1700 to 1750 F shortens the cycle by about 30 percent, it was stated. Propane and methane are enriching agents in the furnace atmosphere. Furnace fixtures do not seem to be adversely affected, and there is no grain coarsening in low alloy steels. At 1780 to 1800 F some grain coarsening appears. Results at this higher temperature are not yet established. Warpage is not increased noticeably, it is said, at the 1750 F temperature. Much 8620 steel is used, and the quench is from 1540 F.

Quenching in hot oil, as practiced by International Harvester at its Fort Wayne works, can replace plug and press quenching. The oil is heated to about 400 F. About 2 points of Rockwell hardness in the core may be sacrificed in the process. The oil is good for about 1000 hr or more, but with an atmosphere blanket over the oil its life is extended. Useful life of 6000 hr is common, and one batch has been in use for 14,000 hr. The spent oil is mixed with a good engine oil and processed into transmission lubricant, worth about 47¢ per gal as compared with a cost of about 37¢ per gal for the original quench oil.

Welding with carbon dioxide gas has the advantage of lower gas cost over inert gas welding, and gives high rate of deposition, deep penetration, and sound welds, the welding panel agreed. Welds are equal to tnose made with low hydrogen electrodes for soundness. Welding of nodular iron is done mostly for repairs, and gas welding is preferable for this and cast iron, with a preheat of 1100 F and controlled slow cooling. When arc welding must be used, a 55 percent nickel electrode is recommended, with 300 to 600 F preheat.

Gear rolling and spline rolling were discussed at the gear and spline production panel, and successful production of most types except crowned gears was claimed. Uniformity of size and hardness of blanks is necessary for accurate work.

The industry is looking for new types of finishes for greater wear resistance in small gas engines, and chrome plating, anodizing, and other treatments were discussed at the small engines panel. Hard chrome plating is best, the panel agreed. Self tapping studs and inserts withstand vibration, and the inserts can be used in cored or drilled holes. Simpler dies for aluminum die casting were advocated as a means to better castings; high pressure on small parts, low pressure on large parts was recommended.

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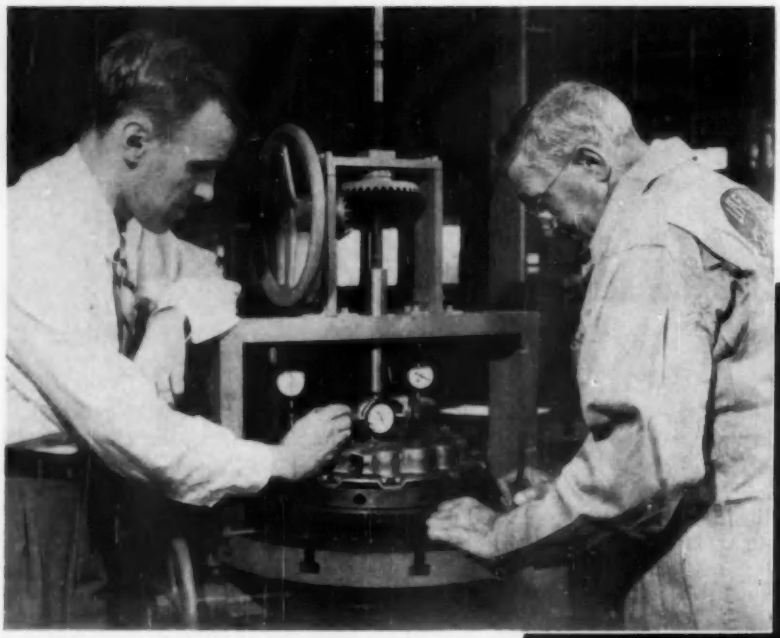


*Checking a new model clutch cover assembly for pressure plate separation and release bearing load*

*Clutch exerciser machine where life of component parts is determined*

# New Clutch Designs Must Pass Severe Tests

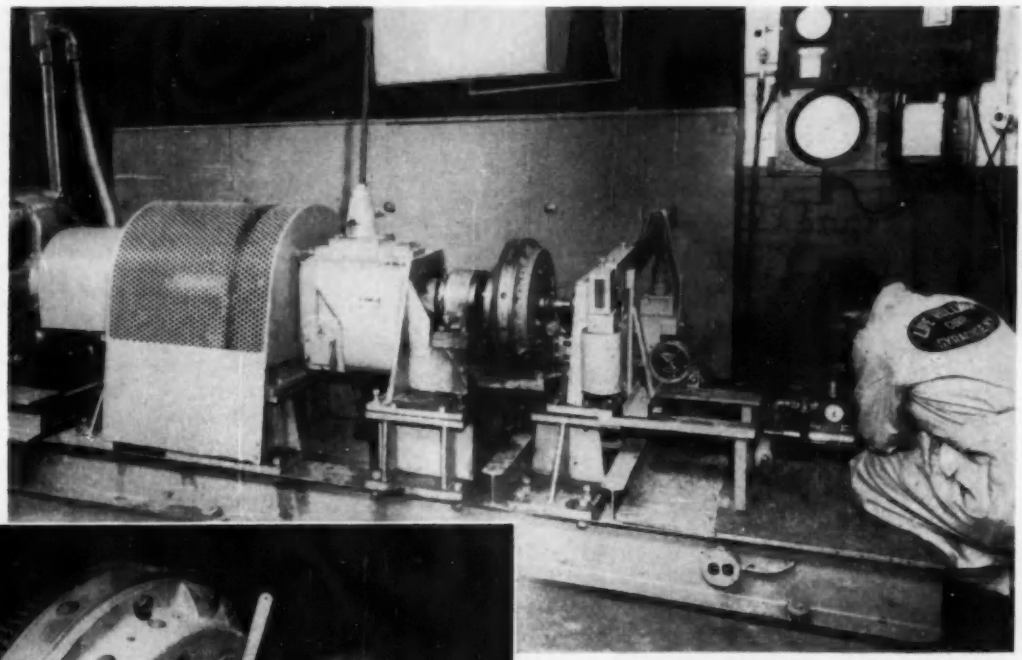
**By David L. Moore, Project Engineer**
**LIPE-ROLLWAY CORP.**

How does a clutch manufacturer know if a new clutch model will perform according to specifications? Notwithstanding careful design, the answer really lies in the effectively simple but rigid testing procedure to which every newly designed clutch must be subjected prior to release for general production and sale.

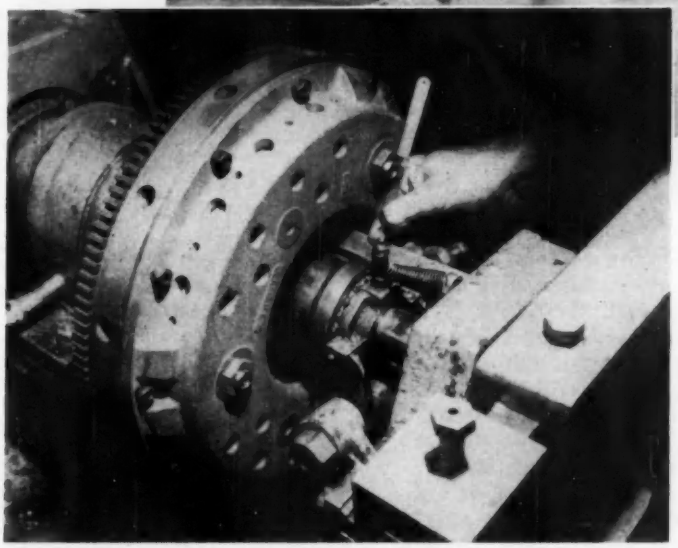
One manufacturer of heavy duty clutches, Lipe-Rollway Corp., Syracuse, N. Y., has established a unique laboratory department where all new products are assembled, tested, and retested according to a carefully planned program.

A project engineer receives preliminary sketches, diagrams, and drawings from the design department. These plans are assigned a project number, submitted to top management for approval which, once received, permits the project engineer to initiate the machining of parts for assembly. Two laboratory technicians devise the necessary tools for assembly and testing of the clutch parts.

When the pilot clutch unit has been assembled it is checked completely for: 1—Adequate plate separation; 2—Possible internal parts interference; 3—Release load; 4—Deflection of surface within the clutch; 5—Total "actual plate force"; 6—Torque capacity;



*Dynamometer test stand where clutch torque capacity is determined and facing wear rates and coefficients are determined*



*On dynamometer, release lever travel is checked and bearing clearance is determined*

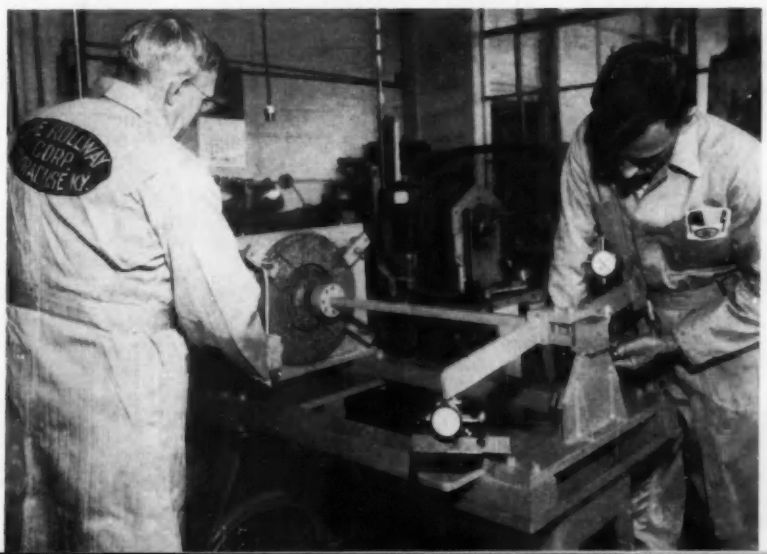
7—Burst limit rpm; 8—Fatigue life.

In general, every new clutch model will have spent six months on the drawing board; three months in assembly and checking; and two months undergoing the following tests.

On a dynamometer, the clutch disk-assembly undergoes a rigorous three-day facing test in which 300 engagements of four seconds slip are made. Each engagement is followed by a cooling period of 116 seconds for a total cycle of two minutes. After every 20 engagements the temperature is checked and the cooling period lengthened to insure a relatively constant temperature during the entire testing period. In engagement, the cover assembly is rotated while the disk is kept stationary. By this means the "facing wear rate and relative friction coefficient" can be determined.

To evaluate the life capacity and degree of "dampening" ability of a particular dampener type disk as-

*Setting up a vibration dampener disk on test stand to determine life, capacity and degree of dampening*



*Setup for burst testing of a Lipe-Rollway DP cover assembly*

*After burst test of disk assembly with new facing material*

sembly, the disk is placed on a vibration generator machine, where vibrations of any desired frequency and amplitude can be effected. In this manner the disk's capacity to eliminate engine vibration is gaged. The vibration generator machine is capable of producing 4000 vibrations per minute—approximating that experienced during the operation of heavy automotive equipment.

To assure adequate life of linkage parts (with reasonable wear) and determine the change in release bearing load as wear occurs, a completely assembled clutch is placed on an "exerciser machine" where the clutch is released and reengaged 110 times per minute, 24 hours a day, for approximately seven days. This standard life test of 1 million disengagements will simulate the use a clutch is put to during approximately 100,000 miles of vehicle travel.

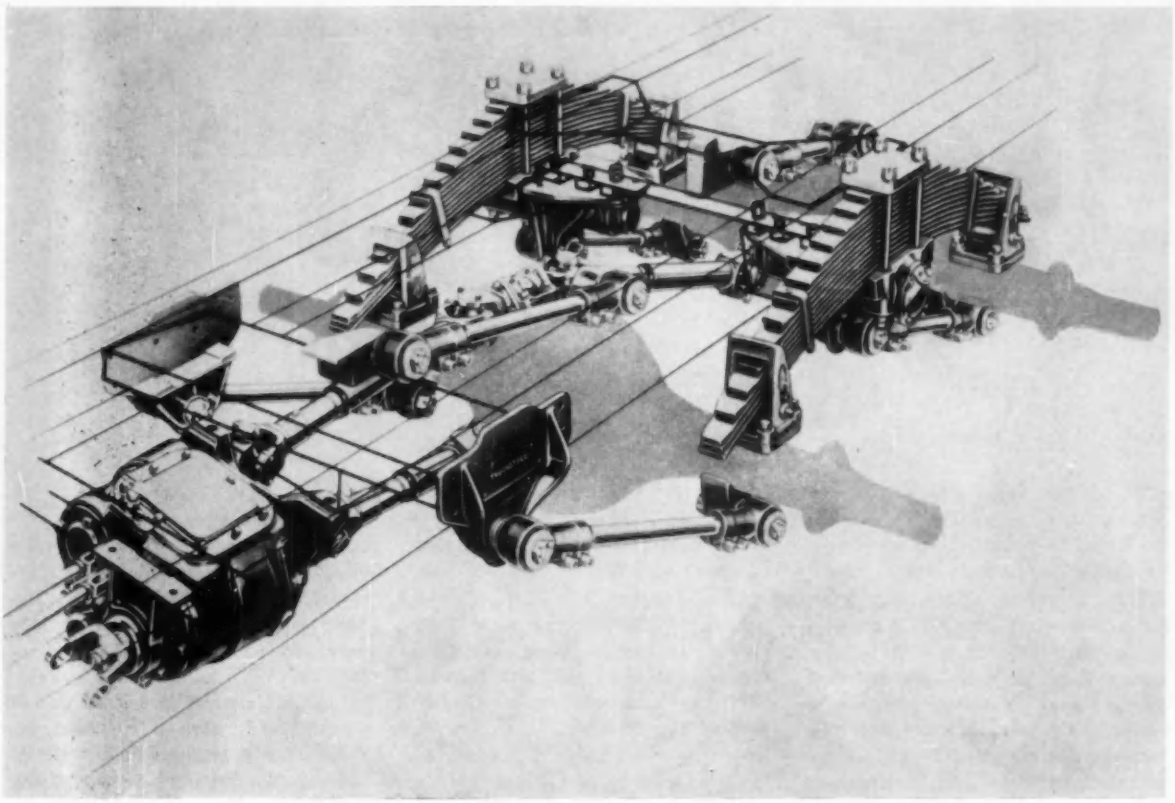
To cover assembly is subsequently given a torque test (also on the dynamometer) in which the clutch is engaged five times at four different speeds from 500 rpm to 2400 rpm. This test is repeated four times, and the average lb-ft engaged slip capacity is measured and recorded on a moving "strip" chart. When measuring torque, the cover assembly is again rotated while the disk remains stationary. In addition, bearing loads are also determined, this time dynamically, so as to evaluate the effects wrought by changing speeds.

Both the disk and cover assembly of a new clutch model are subjected to a disintegration or "burst test" in which maximum safe operating speeds are determined before the clutch will fly apart. Industry-wise it is generally felt that a clutch should be able to revolve at least twice the engine speed—to insure maximum safety under all operating conditions.

In a burst room 25 ft by 15 ft a drive motor is belted to a burst shaft, set to go as high as 10,000 rpm. The clutch assembly is mounted on the shaft, and as the motor speed is increased the shaft speed is correspondingly advanced until the point of burst occurs. The clutch assembly is kept in an enclosed housing where the burst takes place.

Subsequent to this laboratory testing procedure, extensive field installations are made, and only then is the clutch model released for mass production.

• • •



This FORTY-HI suspension is rated at 40,000 lb capacity

# Dual-Drive Tandem for Medium and Heavy Duty Trucks

A 40,000 lb capacity dual-axle drive tandem has been introduced by the Truckstell Manufacturing Co., of Cleveland, Ohio. Called the FORTY-HI, it is designed for the economical field conversion of medium and heavy-duty trucks into extra-heavy-duty carriers. This unit, which can be installed with axles varying through a wide range of capacities up to 21,000 lb, is adaptable to all chassis from the conventional through the tilt-cab and the low-cab-forward models.

The FORTY-HI, designed with special attention to the needs of the off-the-highway operators, offers the following specific features. A 20-in. trunnion-to-ground clearance which facilitates off-the-road operation under heavy load conditions. The parallelogram arrangement of rubber-mounted torque rods, and the free-end walking beams are intended to offer flexibility of dual-drive suspension to insure optimum distribution of load through maximum tire-to-road contact for good traction under all driving conditions. Also, the incorporation of the Truckstell transfer case featuring a single gear box, a three-speed auxiliary, and an axle drive selector offer the operator of the truck a choice between positive dual-axle drive for maximum traction, or single-axle drive for high speed economy where needed.

Initial field reports indicate that Chevrolet 9000 and 10,000 Series trucks equipped with two 18,000-lb axles, and the Ford 900 Model trucks with 21,000-lb axles will form the nucleus of the FORTY-HI market.

. . . Report from the

# FARM EQUIPMENT INDUSTRY

By Kenneth Rose

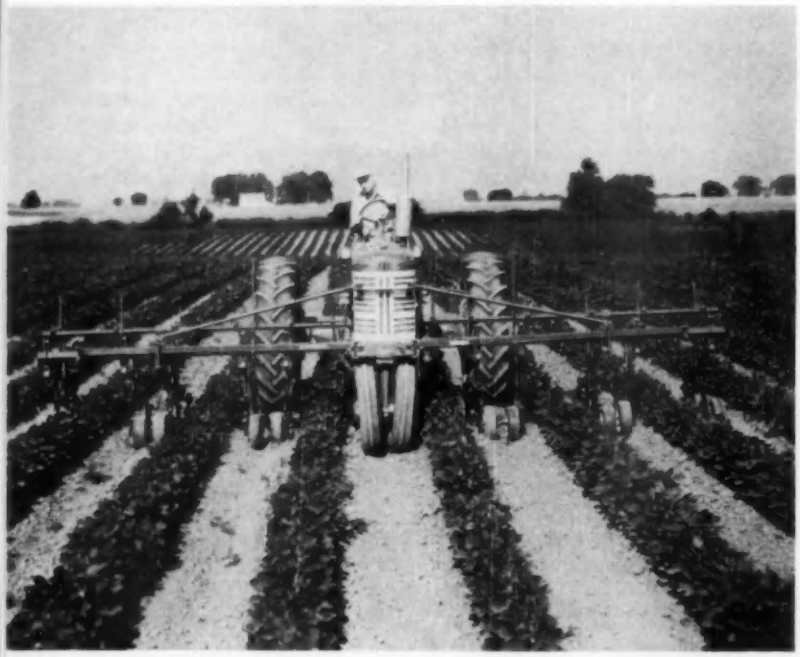
SALES of farm equipment are usually better in the second half of each year than in the first, due in part to the greater amount of money in the hands of farmers at that time. This money is in part the return from the sale of farm products, and in part the payment of Government subsidies. The total of such receipts for the month of July, 1957, as compiled by the U. S. Department of Agriculture, was $2,500,000,000. This compares with $2,070,000,000 in June.

The index of prices received by farmers for the month ending July 15 was 247. This was an increase of 3 points over the preceding month's 244, and over the index of 243 for the July period of a year ago. During the same July period the parity index rose from 82 per cent to 84 per cent, indicating the improved financial condition of the farmers.

## Effects of Capital

HOW capital in the hands of the farmer affects his choice of plans is illustrated in a research bulletin from Iowa State College. When capital is limited to $3000 above basic investment in machinery, managing ability has no effect upon the selection of enterprises, according to the study. The most profitable farm plan is for cash crops (corn-corn-soybean rotation). With about $5000 in capital available, some live-stock should be included, and this would be, first, spring pigs. Live-stock operations in fall pigs, feeder cattle, and poultry become profitable when capital is increased beyond $10,000.

*A six-row cultivator, mounted on a Farmall 450 tractor, and supported on "flat-tired" wheels, is shown in operation.*



## Efficient Use of Equipment

IN an effort to obtain more economical use of machinery, farmers are studying several procedures suggested by agricultural colleges and their experiment stations. Basically, the plan is to achieve minimum tillage, by using several implements hooked together, or by using substitutes for one or more operations. One of these is to hook together a plow and a harrow, or disk harrow, for one operation. Adequate tractor power is needed. Another, useful in lighter soils, is to plow, then plant behind the plow, eliminating the disk harrow. The use of chemical weeding to eliminate one operation with the cultivator is being tried, but with limited success so far. The chemicals used tend to injure the broad-leaved plants, it is said.

## Larger Equipment

THIS summer saw another milestone in farm equipment progress with the offering of six-row

*The new John Deere 214-W Wire-Tie baler (left) and the new 214-T Twine-Tie baler (right).*

implements to American agriculture. International Harvester Co., which had begun production of six-row implements last year in a limited way, announced that it is in full production now, and John Deere and Co. began pilot production on the wide equipment. Both companies report good acceptance by the farmers.

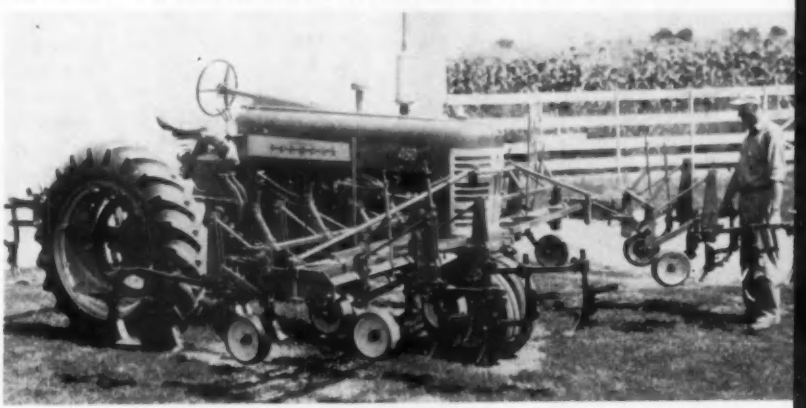
The implements announced by the two companies are, for International Harvester, the six-row cultivator, six-row corn planter, six-row cotton planter, and the six-row Lister planter, the last used for corn, cotton, and some other crops. John Deere has a six-row planter, a bedder, and a cultivator. The equipment is mounted on the farm tractor, though the corn planter may be towed. If towed, it runs on flat tires—a standard agricultural tire that provides cushioning by the flexing of the tire case, and by the slow escape of air through holes in the case. Actuation of the mounted equipment is through the tractor hydraulic system.

Two-row farm equipment was standard until the 1930's, when four-row implements were introduced. Acceptance was rather slow. Even as recently as 1950 and 1951, two-row implements were selling about twice as well as four-row. Within the past year or two, however, agriculture has begun buying more four-row than two-row, in the ratio of about five to four. Representatives of the implement manufacturers are convinced, however, that the farmers will take to the six-row equipment much more rapidly than they did to four-row, pointing out that farms are now bigger, farm labor is more expensive, harder to get at any price, and usually less skilled, and that the six-row implements can save the farmer "a lot of money." Just what the saving would be is affected by so many conditions that it is impossible to generalize.

On the simple basis of the number of rows worked at one time, the six-row implements are half again as productive as four-row. Some additional power is required, but not a great deal. Engineers for the two companies stated that a tractor rated as capable of draw-

(*Turn to page* 130, *please*)

*The frame of this International Harvester implement folds for transportation.*



# Electric Window Regulators *Assembled in* Hydraulic Presses

By J. Howard Stoops
Manufacturing Manager, Huppower Division
HUPP CORP.

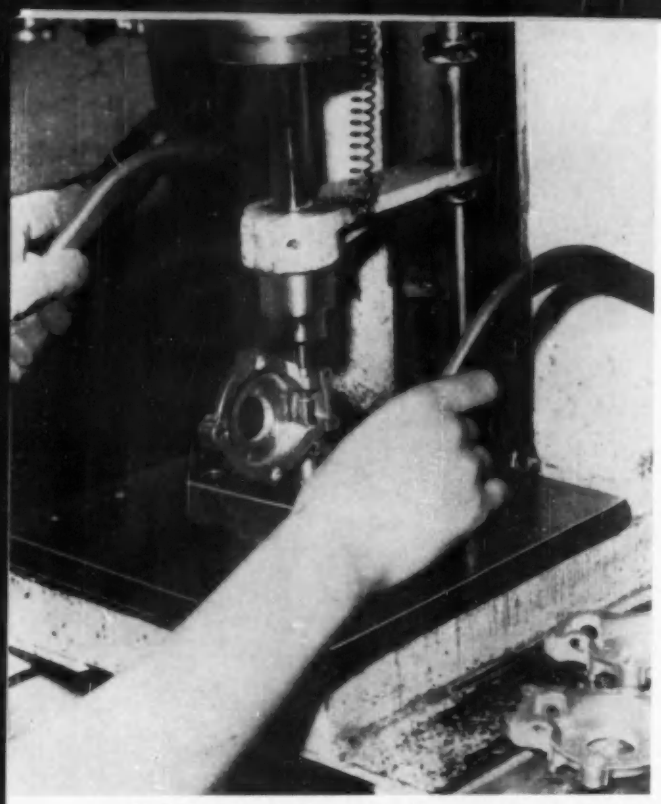
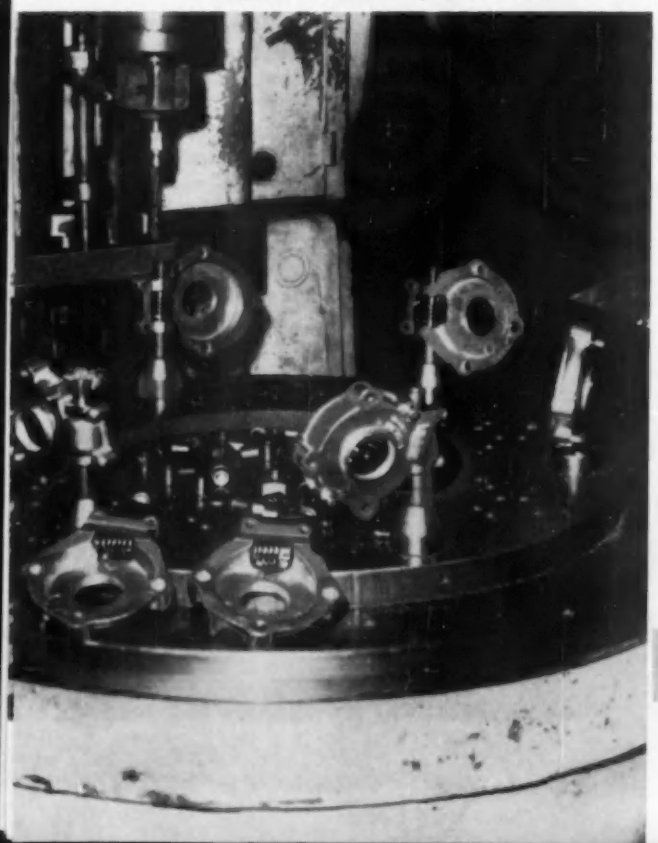


*FIG. 1—Using a Denison hydraulic press to apply the first of two porous bronze bushings to the worm shaft hole in a die cast housing, leaving the inner end of the bushing at predetermined height.*

*FIG. 2—In this Denison rotary dial press setup, used after the worm gear and its shaft are in place, the second bushing for this shaft is pressed home.*



ELECTRICALLY operated assemblies for opening and closing the windows in many American passenger cars are a major product of the Huppower Division of the Hupp Corp., Detroit. Important components of these window regulators are a motor-driven worm and gear in an aluminum alloy die cast housing having a stamped steel cover.

The worm is mounted in sintered porous bronze bearings pressed into the die cast housing which is filled subsequently with grease and sealed with a gasket under the cover. Completion, however, necessitates minimum cost. These requirements are well met by the assembly methods here described.

After the small amount of machining needed on the die casting is completed, it goes to the Denison Multipress, Fig. 1, where one porous bronze bushing is placed on a lower die or anvil below the die casting, whose gasket face is vertical. A punch is then lowered and presses the bushing in against a shoulder.

Next, the housing goes to a bench where the worm is put in place over a short shaft that passes through the worm bore and into the bushing just inserted. Then, the second bushing for the worm shaft is inserted on the dial fixture, the rear station of which is below the ram of the one-ton Denison press, Fig. 2.

There are six vertical pins in the dial, each having an axial hole into which the shaft extension fits. When an assembly is placed with the extension in this hole,

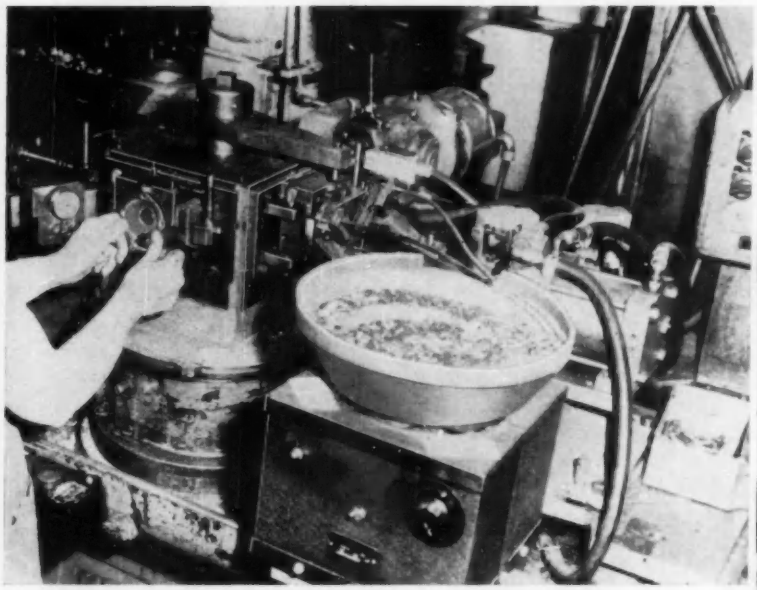


*FIG. 3—Special Kingsbury machine that drills two small holes, one through the worm hub and its shaft and the other through housing and a bronze bushing and later presses a roll pin into each hole.*

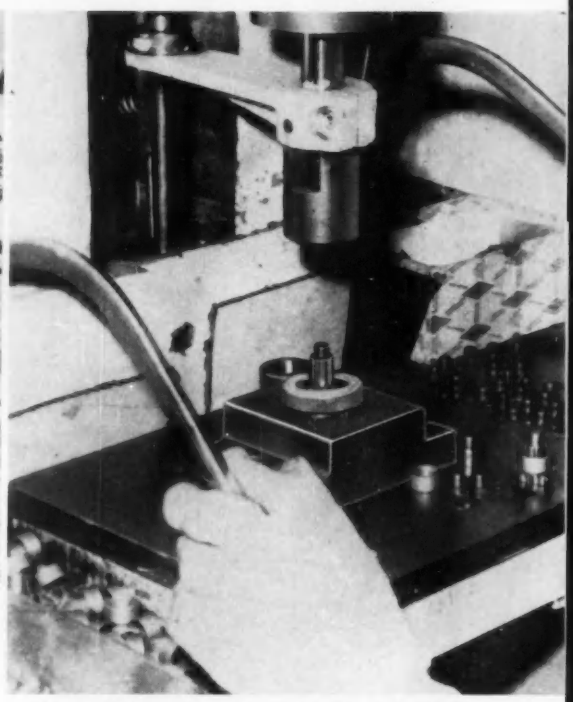


*FIG. 4—This press, equipped with a magnet to hold an inner race of the worm gear bearing in the punch recess, forces the race over the worm gear shaft splines against a thin flat washer placed at the inner face of an integral pinion at one end of the shaft.*

a bushing is placed by hand so that it starts to enter the upper bearing hole of the die casting and is centered by the shaft already at the center of this hole but not touching its walls. When the assembly is indexed under the press ram, it is lowered, pushing the bushing home in the casting.

Flat ends of the worm then rest against the inner ends of the two bushings. It is then necessary to pin the shaft to the worm hub so that the two are locked and will rotate together. Before this is done, however, a small press is used to force a tiny Welch plug into the outer end of what then becomes a blind hole in one bushing, sealing this end against leakage of lubricant.

Drilling of the transverse shaft hole (that also passes through the worm hub) and of another hole of the same size through one worm bearing boss is done in a Kingsbury machine, Fig. 3, made especially to do this drilling and to push a roll pin into each hole. Loading is done, as in Fig. 3, into a fixture that is then locked by a gate. Immediately thereafter, the rear Kingsbury head advances automatically and drills the hole through the worm hub and shaft, then retracts the drill.

Next, the fixture is swung 90 deg about a vertical axis, whereupon the second Kingsbury head advances, drills the second hole and retracts. A second 90-deg indexing then brings the two holes in line with two punches and with two roll pins, each of which is at the bottom of a magazine. After this indexing, the two punches are advanced by an air plunger, pushing the two pins into place, and then retracting, leaving the fixture ready for unloading when it is swung back to loading position. The first roll pin fastens the worm to its shaft and the second roll pin passes through the outer wall of one bushing, locking it in the casting.

Magazines for the roll pins are kept loaded by a Syntron hopper, center in Fig. 3, that feeds the pins into two tubes, each leading to the top of one inclined magazine. Loading and successive indexings of the fixture are done by the operator but other events of the cycle are automatic. A mirror enables the operator to see the rear drill; the drill at the side is always visible.

At the next station, an operator places the assembly against a motor driven Tampico brush to remove any burrs at the end of the pin hole through the worm hub and uses a jet of air to blow away any chips left in the housing. If the worm does not turn freely when its shaft is turned with fingers, a drill press is

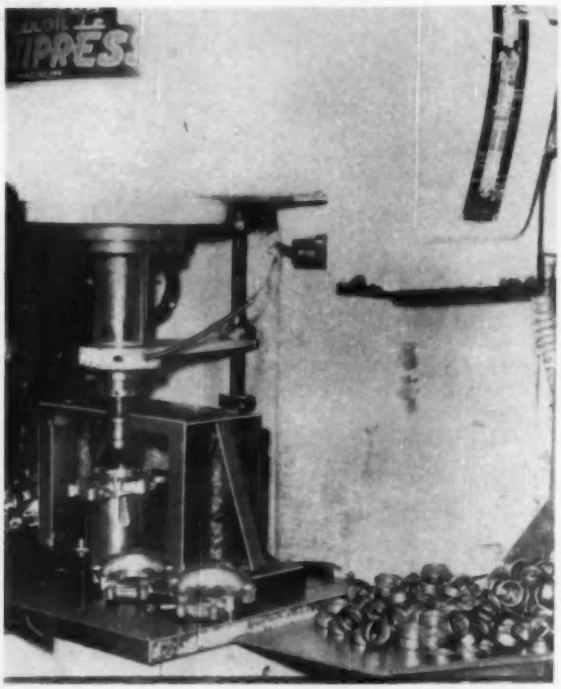


*FIG. 5—Press setup in which the outer race of the worm gear bearing is pressed into the die cast housing shown and is located by seating against a flat face of the die on the bed of the press.*

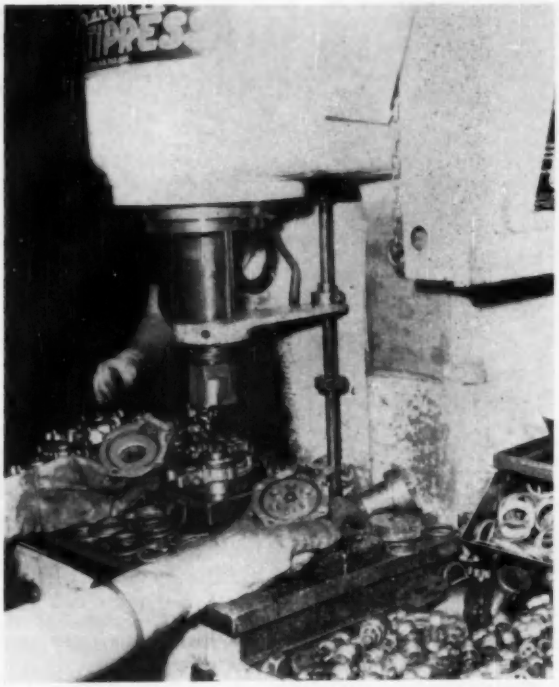


*FIG. 6—Assembly setup in which the worm gear shaft is pressed into the gear, the latter resting against a washer having a large hole. This assembly locates the gear correctly in relation to the worm and to the bearing races for the gear.*

applied to rotate the worm until it does turn freely.

Another Denison press is employed, as shown in Fig. 4, to press an inner bearing race for the worm gear over splines on the short shaft for the worm. This race is seated against a thin washer placed against the inner face of a spur gear that is integral with the shaft and is outside the housing in the final assembly.

To assemble the race, it is placed inside the hollow punch of the press where the race is held by a magnet. A hole in the die on the press bed fits the OD of the pinion that is set in the hole with the shaft up and the washer against the pinion face. When the press is closed, it forces the race over the shaft against the washer. When the punch retracts, its magnet lifts the assembly, which is then taken out by hand.

Assembly of the outer bearing race for the worm gear in the large central hole of the housing is done in another one-ton Denison press, Fig. 5, after the race is set in a die and the housing is placed above the race. When the press closes, it forces the housing down until it seats against a die face that establishes correct endwise location.

In the final Denison press operation, Fig. 6, a worm gear is laid on the press bed and a washer with a large hole that fits a bearing race extension is placed on the worm gear. Then the housing assembly is applied with the worm teeth meshing with gear teeth. A pinion shaft assembly is placed in the center. Closing of the press forces these components together so that they assume correct final positions.

Next, on an assembly bench, a flat washer is centered over the short projecting shaft and against the flat face of the worm gear, after which a lock ring is applied to the shaft groove, holding the washer in place. A color code mark is then applied to identify the type of assembly, as several (differing in minor details, such as various gear ratios) are produced.

Grease is then applied and a gasket is laid on the open face of the casting, after which a stamped cover is put on and is fastened with two screws applied with a Detroit power screw driver. Before this assembly, a bushing to fit the worm gear shaft end is pressed into the central hole of the stamped cover and is sealed with a small Welch plug, pressed into the bushing hole. These operations are done before the cover assembly is plated.

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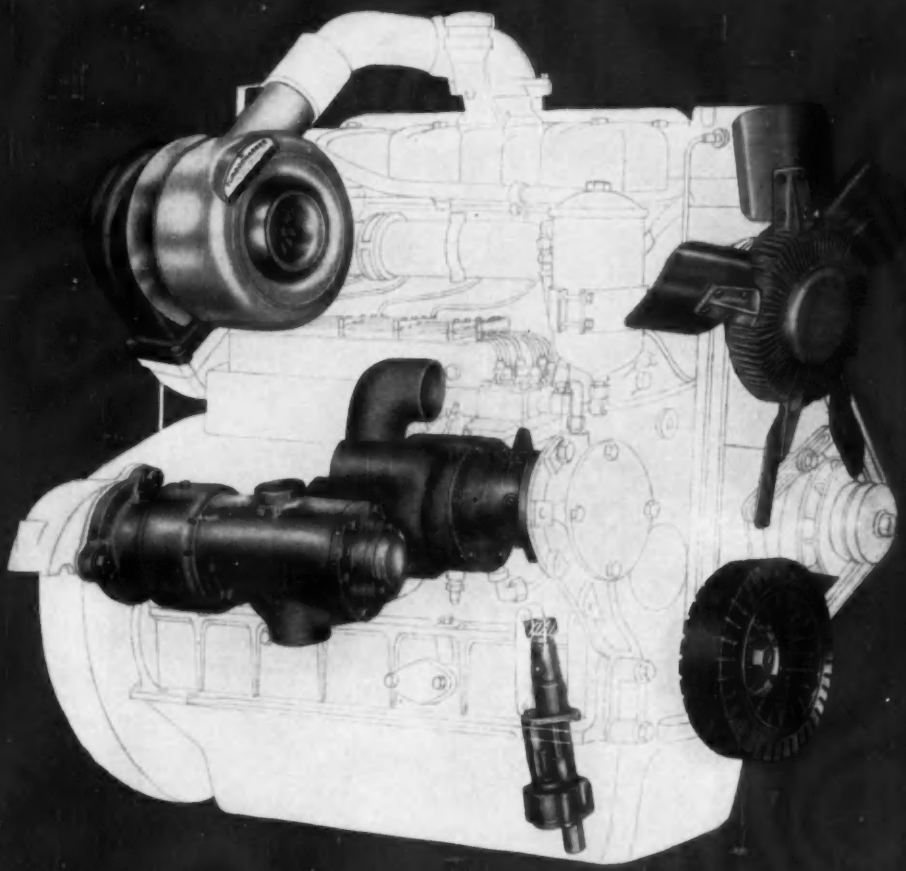

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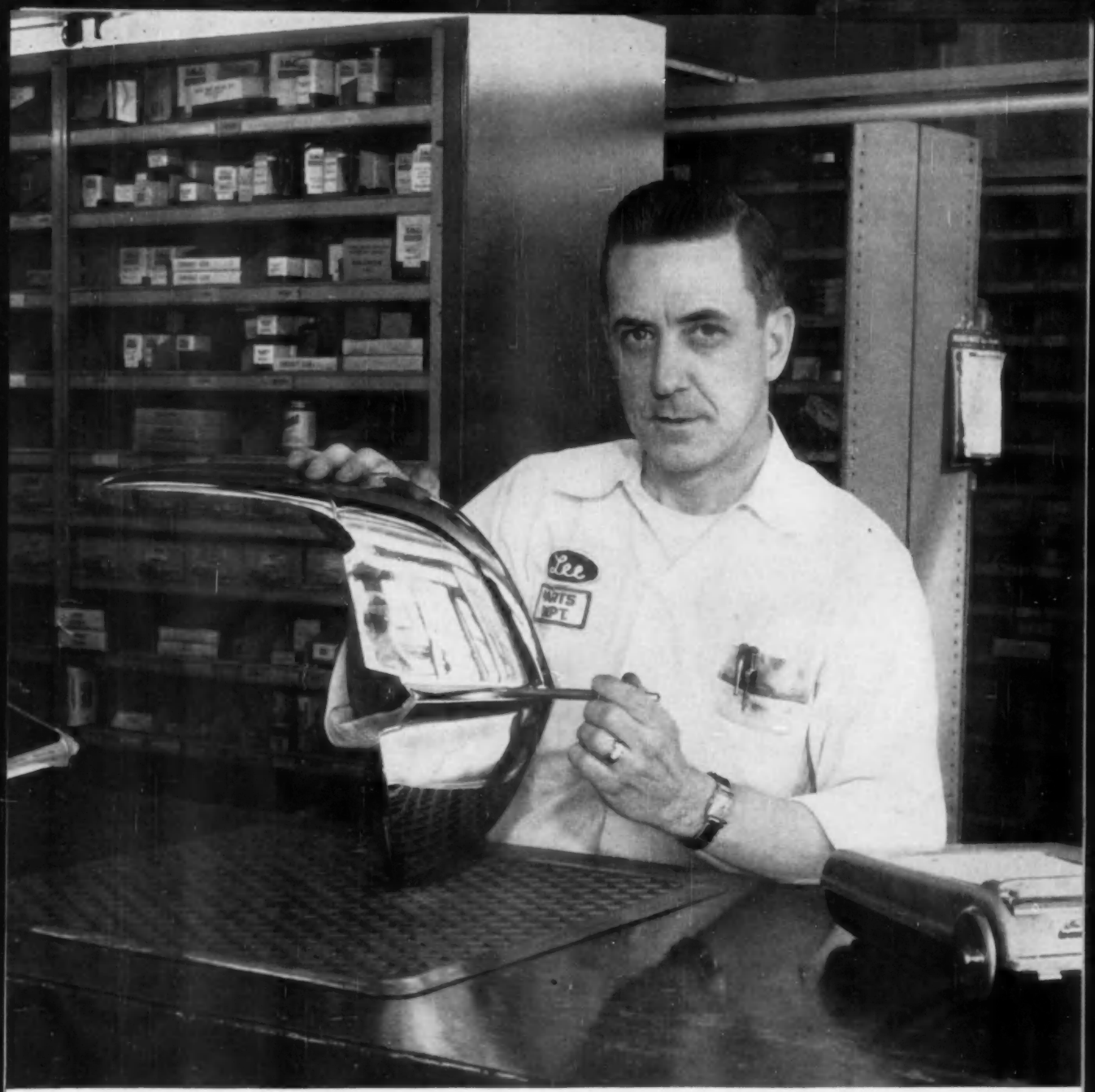


# "The best parts? Sure, they're made of Stainless"

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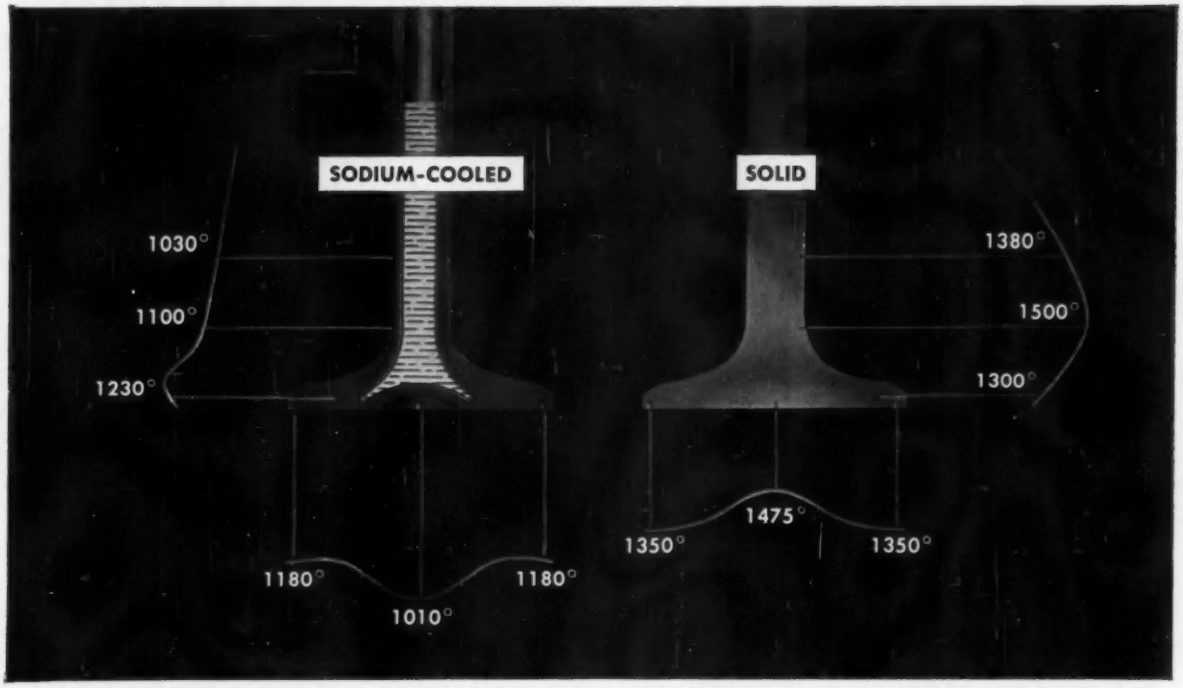
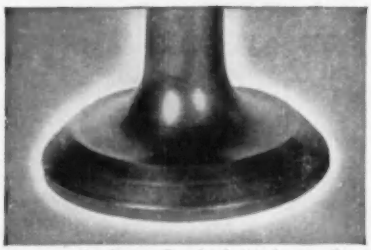
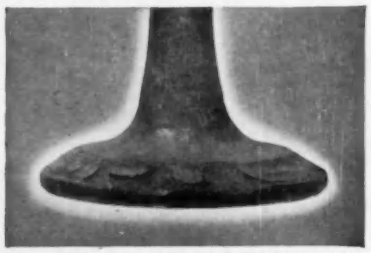
# Eaton Sodium-Cooled Valves Run Cooler—




These curves show operating temperatures of Sodium-Cooled and Solid Valves under similar conditions of high output.



Eaton Sodium-Cooled Valve after 110,000 miles—still in good condition.



Conventional valve after 35,000 miles in same type of operation as Sodium-Cooled Valve shown above.

## Cooler Valves Last Longer

Today's trend in engine design toward higher speeds and more economical fuel-air ratios results in higher temperatures for many operating parts—including exhaust valves. These higher temperatures sharply reduce valve resistance to corrosion and distortion, definitely limiting valve life. Eaton Sodium-Cooled Valves, operating at considerably lower temperatures, maintain corrosion resistance and strength.

In general, maintenance of Eaton Sodium-Cooled Valves in heavy-duty truck engines is scheduled only at time of major engine overhaul. No in-between trips to the shop are necessary for valve servicing. Engine output is maintained at high levels over long mileages. In many millions of miles of heavy-duty operation, Eaton Sodium-Cooled Valves have proven their ability to keep trucks on the road and out of the shop.

Eaton engineers will be glad to work with you in applying the benefits of Sodium-Cooled Valves to your engines.

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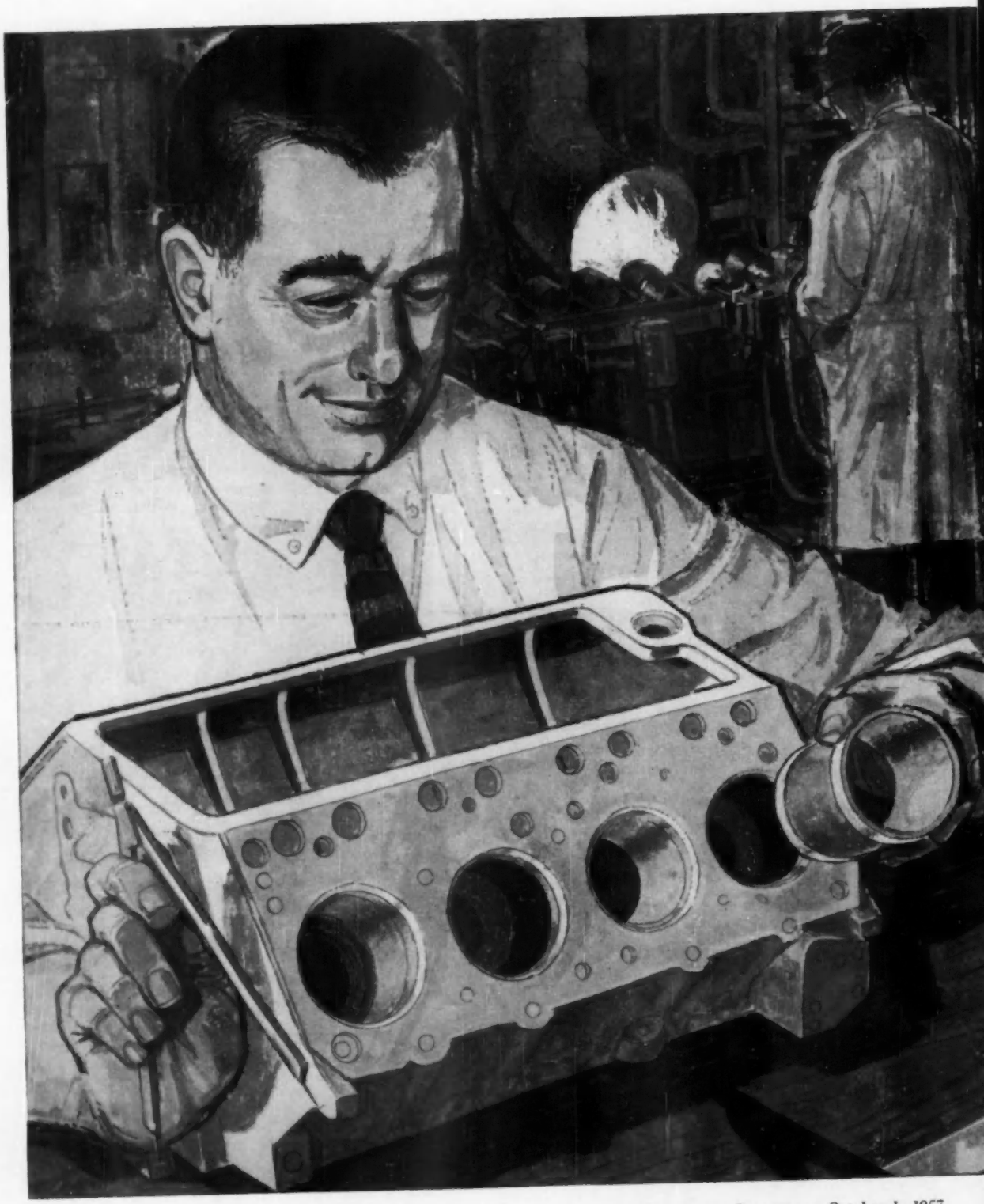
# On drawing boards now...



# the all-aluminum engine!

Out of the Alcoa Development Division's Laboratory have come new processes that have leading manufacturers designing all-aluminum engines right now. After more than a decade of experimentation with sprayed cylinder liners, a method has been developed that gives aluminum a wear resistance superior to that of iron.

## Hard coating only 3/1000 inch thick

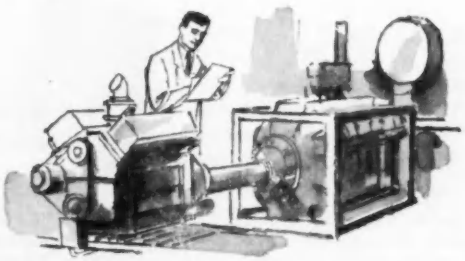
A hard coating of molybdenum is sprayed on the aluminum, using the patented Metco "Sprabond" process. Coating thicknesses ranging upward from 3/1000 are common. A coating of steel may be sprayed on the molybdenum if desired.

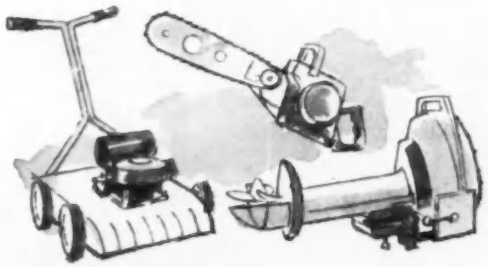
## Cylinder liners investigated

Considerable development is centered around the use of liners in an aluminum block. The die-cast or permanent mold-cast method may be used to manufacture blocks, eliminating the necessity of using a sand core. Some designers favor using an iron liner. Other engineers prefer the use of an aluminum liner sprayed with molybdenum. One engineering group is investigating the use of hard aluminum alloys—rings would bear directly on aluminum!

## Many benefits

The all-aluminum automotive engine deserves a new design from top to bottom to obtain all the benefits inherent in aluminum. Better temperature distribution contributes to greater freedom from thermal distortion. Important among the benefits, of course, is weight saving.





The much lighter aluminum engine will improve weight distribution in the vehicle tremendously, adding to roadability and ease of handling.

## Smaller engines ready for production

Builders of industrial engines for chain saws and lawn mowers and outboard engines, already producing aluminum engines, are investigating this sprayed coating. Experimental engines have logged many hundreds of hours accumulating favorable cylinder wear data. The hard-faced molybdenum coating that is used does the job with wear to spare.

## Other applications

Other likely applications for the Sprabond process include "ways" for machine tools, V-belt pulleys, brake drums, cylinder walls on hydraulic fixtures, pumps, compressors and clutch plates. Now that aluminum can be given wear resistance superior to that of iron, one of the last barriers to its use in many new applications is removed.

## Let Alcoa help

Alcoa, the most experienced producer of aluminum in the industry, stands ready to offer the facilities of its laboratories and the knowledge of its engineers to manufacturers developing all-aluminum engines. Let us work with you. Write Aluminum Company of America, Development Division, 1841-K Alcoa Building, Pittsburgh 19, Pennsylvania.

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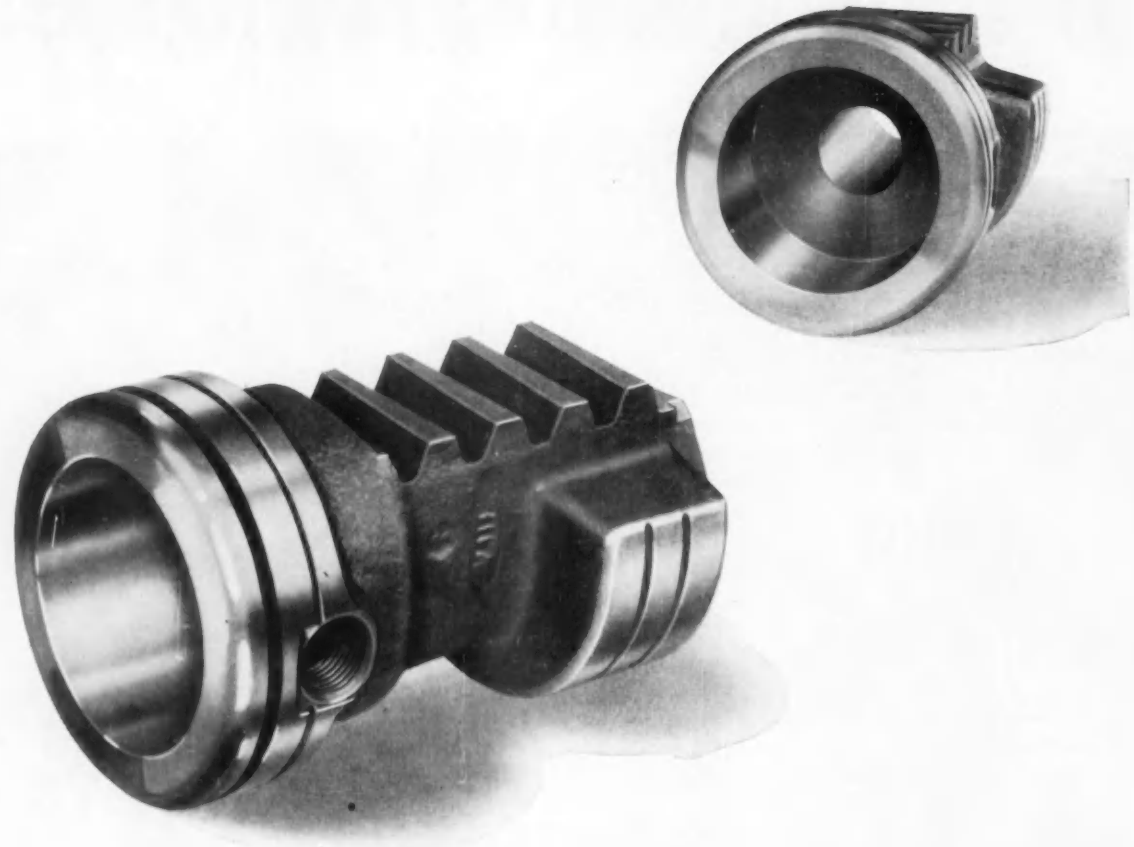

# TOOL LIFE SOARED FROM 25 TO 750 PIECES WITH ARISTOLOY LEADED

## *Counterboring 8 lb. forging was costly for large steering gear manufacturer*

Excessive tool breakage was running into hundreds of dollars per month for a large automobile parts manufacturer. On 2.17" ID counterboring operation of this forging made from A.I.S.I. 5120, chips were long and continuous. They wrapped around the tool, fouling it and causing premature tool failure. Tool life averaged only 25 pieces per tool.

A change to Leaded Aristoloy 5117 brought about an immediate improvement not only in tool life but in increased production and vastly improved finish. Tool life was upped to 750 pieces per tool. Spindle speed was increased from 113 to 239 R.P.M. and feed from .007 to .0134 I.P.R.

If you have a problem involving counterboring or deep hole drilling, call your nearest Copperweld district office. We will be glad to have a field metallurgist, experienced in application of lead treated steels, work with you.

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# News of the MACHINERY INDUSTRIES

By Charles A. Weinert

**Federal Government Shows Increasing Interest in Building-Block Design of Machine Tools to Facilitate Production of War Materiel in the Event of a National Emergency**

## Government To Look Into Building-Block Concept

Interest of the Government in applying the building-block concept to machine tools livened considerably following a recent meeting. Mobilization officials met with Ford Motor Co. engineers, D. C. Pippel and Henry Daum, at the Pentagon on Sept. 11, to discuss the subject.

The potential value of in-line transfer machines composed of modular or unitized components is attractive to mobilization planners. It is being visualized that tanks, tank engines, aircraft engines and other war materiel could, in the event of a national emergency, be produced more quickly and at less cost for retooling. Current thinking may conceivably lead, eventually, to revisions in the Government's long-range tooling program.

Such a project does, however, involve many considerations, among them large expenditures of money. It is also agreed that case-history studies must be made to determine where it will and will not be practical.

Mr. Pippel, who directs mobilization planning and defense sales at Ford, explained to Government officials why Ford believes the building-block concept of interchangeable unitized components is the answer to high-volume low-cost production. (Ed. note—It is well known in the automobile industry that the concept could be very advantageously applied, other factors being equal. Rapid design changes have already obsoleted some expensive single-purpose transfer machines much earlier than originally anticipated.)

Mr. Daum, who manages Ford's Machining Process Department (Manufacturing Engineering Office), outlined for the Government men what he considers to be the key points in the building-block principle. (Ed. note—Machine tool builders are generally familiar with these basic ideas. As a matter of fact, some concrete recognition has been given to them in the design of transfer machines of recent vintage.)

Defense Department tool and mobilization men were impressed by the presentations, enough so that a request was made of the Metalworking Equipment Div., Business and Defense Services Administration of the U. S. Department of Commerce, to proceed with an analysis of possible applications of the concept. Niels A. Olsen, deputy director of the Metalworking Equipment Div., plans to call upon the tool builders and tool executives in the Government when conducting this detailed study. In accepting the assignment Mr. Olsen said, "Right now, only two points are definitely established. First, this will be a joint study, with both industry executives and Government taking a part. Secondly, we'll need all the help we can get, as this is clearly one of the biggest tool proposals to come before the Government in many years."

## National Acme Co. Has Open House

The National Acme Co. had an open house at its Cleveland plant on September 10 and 11 for customer and supplier representatives. A feature of the show was a cooperative machining demonstration jointly sponsored by the Aluminum Co. of America and The National Acme Co. A special area was sat up where a number of automatic screw machines were demonstrated actually producing small parts of aluminum, brass and steel. Overall savings by the use of free-cutting 2011T3 aluminum were charted. In addition to having in operation the latest Acme-Gridley six-spindle bar automatic, the 7/16-in. RA-6, British-built B.S.A. single spindle screw machines were demonstrated. The B.S.A. line is being distributed in this country by National-Acme.

The show also included a premiering of Alcoa's new color motion picture, "The Four Amazing Alloys," as well as a colorful exhibit of the wide range of products and components now being made from free-machining aluminum screw stock.

A full tour of the plant then followed. Among the new machines on the line were bar automatics for performing high-volume multiple operations on carburetor throttle shafts, spark plug terminals, small electrical connectors, business machine parts, and even razor parts. All in all, the "open house" was very interesting and a big success.

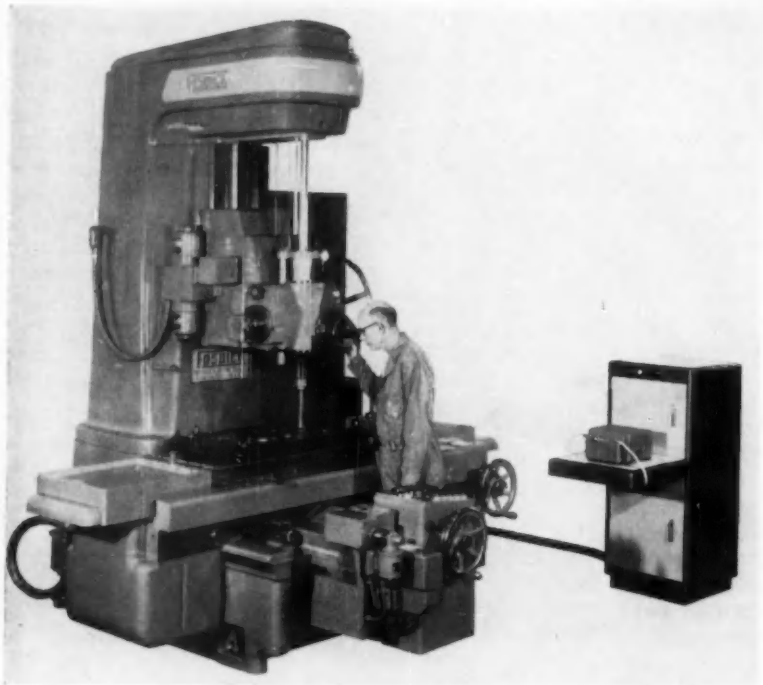
## Sheffield Corp. Acquires British Gage Company

Louis Polk, president of The Sheffield Corp., a subsidiary of Bendix Aviation Corp., recently announced acquisition of a major

(*Turn to page* 113, *please*)

# NEW PRODUCTION and PLANT EQUIPMENT

*FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89*



*Fosmatic tape-controlled jig borer allows complete programming of table positions and spindle feeds and speeds*

## Automatic Tape-Controlled Jig Borer

IN the operation of a tape-controlled jig borer recently unveiled the operator simply loads the part to be machined on the jig borer table and presses a button which positions the table and sets the spindle speed and feed according to values punched in the tape.

Tapes are prepared in the engineering department where an efficient order of operations is programmed. Dimensions from part prints are punched directly into the tape without the need for coding, since a decimal tape punch is used. Tools are set in the toolroom and numbered according to the operations program. Tapes may be stored so that production runs of the same part can be repeated at later dates.

The measuring system used allows the table to be positioned automatically to tolerances of ±0.001 in. For measurements along x and y coordinates, series of class A measuring gages are lined up. There are four gages in even tens of inches, 10 in inches, 10 in tenths of inches and so on down to 0.0001 in. increments. The gages are selected by motor-driven drum dials and positioned end to end to provide the required measurements. Movement of the table stacks the gages and moves them to operate a switching mechanism. At the point of final position, the table movement is stopped, the traverse screw is relieved by reversing it slightly, and the table is clamped.

The Fosmatic jig borer model 54P provides 16 speeds from 30 to 1800 rpm controlled by electro-magnetic clutches. Eight feed rates from 0.0005 to 0.010 ipm can be selected. Table size is 54 by 22 in. Table to spindle capacity is 27½ in. *The Fosdick Machine Tool Co.*

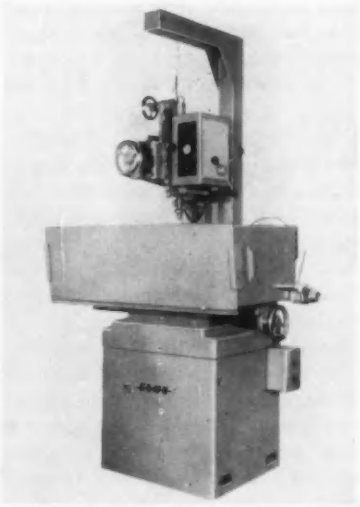
**Circle 30 on postcard for more data**

## Die Machine

MADE specifically for the machining of dies, the Elox M-501 18x43 DieMatic, which utilizes electrical rather than mechanical energy, is said to offer several advantages. Machining is completely automatic; dies may be machined after heat treatment, avoiding heat treat-distortions; forge dies can be reworked after washout without removing the entire cavity; and the process imparts a machined surface which is stated to normally improve die life.

The M-501 Die-Matic machines any metal regardless of hardness or density. It is likewise usable on soft steels and non-ferrous metals such as magnesium and aluminum. The cutting tools can be machined, forged, extruded from free machining brass or can be cast from Elo-Met, an inexpensive low temperature alloy developed by the company for this purpose. The machine has longitudinal travel on the table, cross slide travel on the overarm, and vertical adjustment on the cross slide assembly for easy adjustment of electrode to workpiece. Power supply is a separate unit mounted on casters. *Elox Corp.*

**Circle 31 on postcard for more data**



*Elox M-501 Die-Matic machines dies*

## Gasket Spotting Unit

DEVELOPED for the automotive industry, a gasket spotting machine spots adhesive on gaskets to hold them in place until an assembly is completed. It is used in conjunction with the newly-developed Armstrong T-922 hot melt adhesive which gives instant bonding.

The machine is manually operated, but is adaptable to automatic use. It contains a tank for heating the adhesive and a thermostatically-controlled heating element for keeping the adhesive at the correct consistency. The gasket is placed on the bedplate on top of the tank and vertical studs on a hollow frame inside the tank are raised through holes in the bedplate, depositing adhesive at desired spots on the gasket. The machine will accommodate different size gaskets.

T-922 adhesive is supplied in cakes to fit the adhesive tank. It is a soft, tacky, dark brown solid at room temperature and becomes liquid when heated. The tank on the machine will hold about six gallons of adhesive, enough for 20,000 to 30,000 gaskets. *Armstrong Cork Co.*

*Armstrong gasket spotting machine*

Circle 32 on postcard for more data

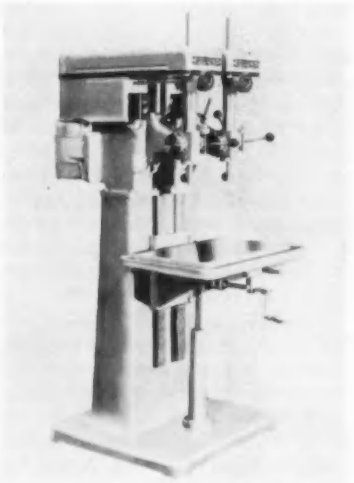
## Drilling Machine

FEATURING a 10-in. overhang for greater application adaptability, a new drilling machine has been designed to meet needs for high-speed sensitive drilling of small parts and assemblies. Called Model 1F, it is available in standard or special-purpose combinations of from one to six spindles, with speed ranges from 625 to 10,000 rpm.

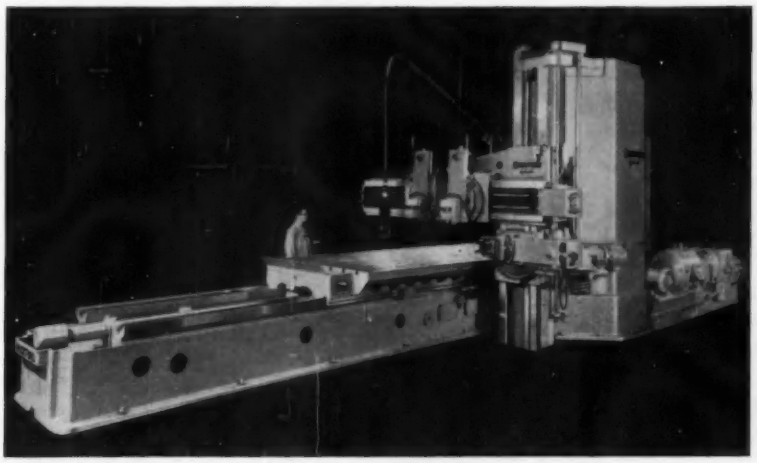
Positive control of speeds to match work requirements is obtained by turning a knob conveniently located or the upper column. Accurate speeds are quickly obtained by means of the company's Vari-Speed drive which has a variable-diameter vee-pulley system. Spindle speed is shown in a speed indicator window next to the control knob.

The machine is equipped with a pre-positioned micrometer - graduated depth gage which can be set by knob to anywhere within the three-inch traverse of the spindle. A spindle tension control permits slow to quick-springy return of the spindle. Pedestal and bench models of the machine are available. *Edlund Machinery Co.*

Circle 33 on postcard for more data



*Edlund Model 1F drilling machine*



*Rockford deluxe Hydraulic planer is available in sizes 60 by 60 in. and up.*

## Heavy-Duty Hydraulic Planer of New Design

CONSTRUCTED to take advantage of the most modern cutting tools and cutting techniques, a new heavy-duty planer includes such features as power rapid traverse, power rail elevation, automatic power rail-lock, and automatic way lubrication. It has a heavy column, crossrail and head construction for full tool utilization.

Available in the larger sizes 60 by 60 in. and above, the planer may be had with either the conventional single circuit, or the new high-speed h3 triple circuit. On both machines movements of the heads are controlled from the pendant. On machines with the h3 drive, complete table control (including speed adjustment with a direct-reading speed indicator) is also obtained from the pendant.

The planer has a new Tool-trol feature, which is an integral part of the head control and permits manual inching, in vertical and horizontal directions, of either head—from either end of the rail, or from the head itself. This, coupled with pendant actuation of feed and traverse movements, permits operating efficiency for setups. Another feature is the use of two-speed traverse motors: maximum speed for approximate positioning, and slow speed for close power-positioning of the heads. *Rockford Machine Tool Co.*

Circle 34 on postcard for more data

*Huck Model 800 two-gun hydraulic power pack being used to drive Huckbolt fastener in sample assembly. Second driving tool, also shown, can be operated at the same time. The power pack is also obtainable in a four-gun design known as Model 801.*

## Power Units Operate Multiple Fastener Tools

HYDRAULIC power packs that permit simultaneous operation of two, three or four fastener driving tools at full working pressure are available in a new line. Designated Series 800, they are designed for use with Huck standard hydraulic driving tools. The first units are the Model 800 two-gun design and the Model 801 for use with as many as four guns. Guns may be used in any combination to drive the full range of Huck fasteners up to ½-in. size.

Although it is a stationary unit while in use, the power pack is in effect a semi-portable central hydraulic system. It does not require permanent anchoring and is movable by means of a fork lift truck. One of its stated major advantages is flexibility in application of the driving tool at great distances from the power supply. Even where hose lengths as great as 100 ft are used, power loss at the tool is negligible.

Series 800 power packs are available for either 220 or 440-v operation. The drive motor is an induction constant-speed type rated at 10-hp for the Model 800, and at 15-hp for the Model 801. Model 800 is equipped with a 4½ gpm pump; while Model 801 has a double pump, each section rated at 4½ gpm for a total capacity of 9 gpm. Oil is delivered to flow control valves that permit individual regulation of volume delivered to each gun in the circuit. The complete unit is built to JIC standards. *Huck Manufacturing Co.*

Circle 35 on postcard for more data

## Abrasive Belt Grinder

NEWLY designed pinch roll belt grinders for grinding titanium, stainless steel or carbon steel flat stock have been announced as additions to a line of grinders offered by Mattison Machine Works. Four machine sizes are available, providing capacities of 36, 48, 60 and 72 in. Feed roll speeds are fully adjustable from 1 to 100 fpm. The design of the belt drive and idling mechanism provides for belt travel over four rolls designed in a diamond shape. This arrangement, together with the 20 ft 3 in. belt, provides flexing and chip removal, plus allowing the belt to remain cool and free-cutting.

Belt adjustment is through the top idler roll that can be adjusted vertically for correct tension and cambered for belt alignment. An attachment for spraying coolant or lubricant on either the abrasive belt or work is available. For positive stock removal and holding size, two air-controlled dash-pots move the billy roll up against positive stops parallel to the contact roll and test runs indicate thickness can be held within 0.0015 in.

Size of the main drive motor ranges from 40 to 150 hp, depending on machine size. All operating controls are located at the front of the machine and a load ammeter indicates the amount of grinding load. Feed and work roll design are such that material can be fed with the rotation of the belt or against it with equal efficiency. A roll grinding attachment and stand for regrinding contact roll is available as an optional accessory.

Circle 36 on postcard for more data

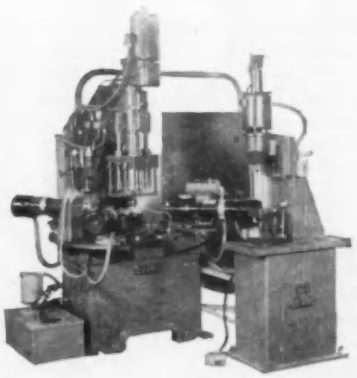
## Two-Position Machine

DESIGNED for high-production drilling and tapping operations, a two-position machine recently developed incorporates two vertical and five horizontal units for drilling and tapping 12 holes in three similar parts. Two holes are drilled in one position and 10 holes are tapped in the second position.

The operator alternately loads the two machines, completing the drilling operations on a manually-clamped fixture (right of illustration), and tapping the 10 holes simultaneously on the second machine (left) which automatically clamps, taps and releases the part. Output is 300 parts per hour.

By making changes in the number and arrangement of the units, the machine is adaptable to a variety of operations. *Govro-Nelson Co.*

Circle 37 on postcard for more data



*Govro-Nelson dual machine for multiple drilling and tapping operations*

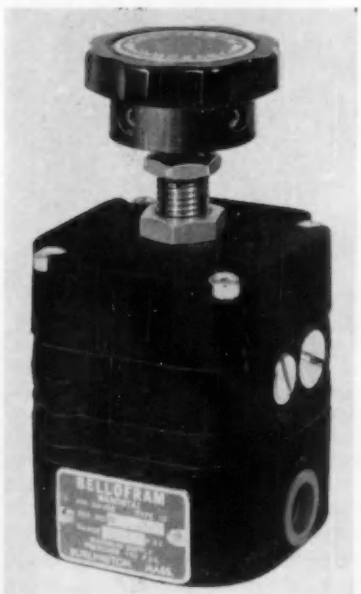
## Coil Winding Machine

SIMULTANEOUS, separate or sequential 360 degree continuous winding of wire and/or tape can be obtained on a new series of automatic dual-purpose toroidal winding and taping machines. Toroyd series UT machines are equipped with a core-turning table, automatic forward and reverse feed, stepless variable pitch control, calibrated adjustable twin tension brakes, quick-locking shuttlegear and magazine, automatic predetermining counter, tape footage indicator and automatic cut-off. An adjustable coil clamp fixture for sector winding up to 270 degrees is available as optional equipment. The new series consists of two models, UT-14, with a wire diam range of No. 20 to No. 7, and UT-20 having a range of No. 14 to No. 5, both accommodating most commercial ¾ to 1 in. tapes. *Universal Mfg. Co.*

**Circle 38 on postcard for more data**

## Pressure Controller

HIGH accuracy in air gaging control is said to be possible with a new "drift-free" pressure controller just introduced. Called the Type 10 Air Gaging Manostat, it is claimed



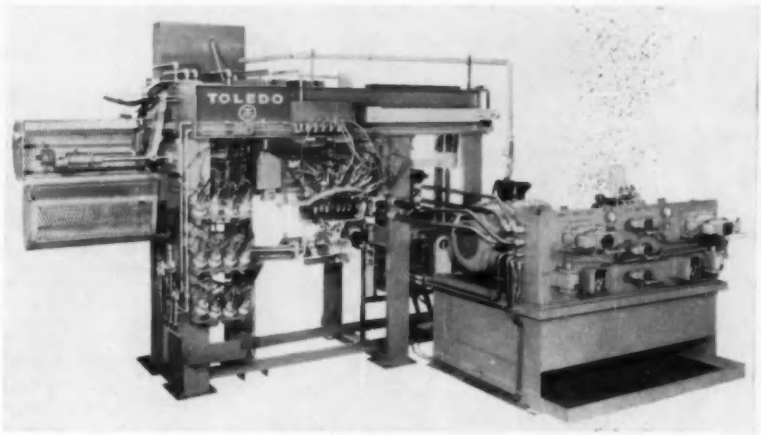

*Bellofram type 10 air gaging manostat*

to give precise downstream pressure control over wide supply pressure variations, and to remain stable through temperature changes as well as supply or flow variations.

The device utilizes a high-gain servo system, with main valve action controlled by a pilot nozzle which in turn is activated by slight pressure variances. Instantaneous adjustment of controlled pressure is achieved by the small relative movement required between the pilot valve and its seat to initiate great changes in main valve action. To eliminate bothersome exhaust valve pickup on dead-end service and initial drop-off, pilot pressure is bled directly to atmosphere rather than downstream.

Resolution is said to be one part in 10,000 of range, and repeatability usually less than one part in 5000 of range. Manostats are available in ranges of 2 to 25 and 3 to 60 psi, in ⅛ and ¼-in. pipe sizes. *Bellofram Products Corp.*

**Circle 39 on postcard for more data**




*Toledo model 9042 electronic tester color-codes automobile springs at high rates*

## Machine Tests and Classifies Helical Springs

DESIGNED especially for testing automobile springs, a new helical spring tester performs bulldozing, testing and color coding operations. Speeds of up to 900 springs per hour are possible with the unit, known as the 9042 electronic spring tester.

The indicating mechanism is of the Toledo dynamic weighing type. This mechanism transmits weight signals to an electronic counter which in turn controls the color coding equipment. This equipment consists of a pneumatic painting unit capable of spraying a different color paint for each of five spring classifications.

In operation a spring is placed on the vertical turntable. The turntable which is hydraulically operated, moves the spring to the various stations. First, it is moved to the bulldozing station, where the initial stress is set up. Next, at the test station, it is compressed a predetermined distance. Finally, it moves to the color coding station where paint is sprayed on the spring, placing it either in one of four acceptable zones or in an underzone. Springs falling into the overzone are left unpainted so they may be run again. *Toledo Scale Co.*

**Circle 40 on postcard for more data**

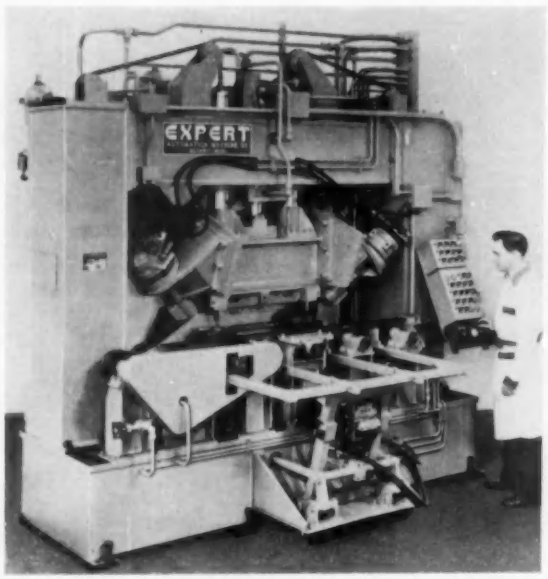
## Printed-Circuit Line

AN automatic production line for plating printed circuits, incorporating a Stevens automatic processing machine, was recently engineered. The machine is designed for copper plating circuits, and is capable of producing over five million individual circuit boards annually.

The plating tank is 75 ft long. Each individual arm holds two racks, each rack holding 24 boards in position for the electrolytic deposition of the copper patterns.

Use of the automatic equipment is said to insure high production, uniformity of deposit, positive conductivity, and the plating through of holes and eyelets which form a mechanical bond to circuits on both sides of the base. *Frederic B. Stevens, Inc.*

**Circle 41 on postcard for more data**




*Expert three-station in-line transfer forming machine performs all bending operations in one working station. It performs four bends and contours in pre-heated rectangular steel bars to produce 500 bumper support arms per hour.*

## Forming Machine for Bumper Support Arms

INTRODUCTION has been made of a three-station forming machine that performs four bends and contours in rectangular steel bars to produce bumper support arms. All bending and contour forming operations are performed in one working station to allow complete forming of the part while it is still at the required temperature for bending.

In the working station, an overhead hydraulically operated ram does one bending operation while a hydraulically operated die set does the three remaining bending operations. With this type of design, the machine can be adapted to a variety of parts requiring various bends and contours by changing the die set. The machine, which produces 500 formed bumper support arms per hour, is an in-line transfer type machine in which the parts are automatically transferred from station-to-station by means of a hydraulically operated walking beam transfer mechanism.

In operation, parts to be formed are automatically fed from a furnace to the transfer mechanism of the machine. The transfer mechanism is operated by two hydraulic cylinders which lift the mechanism vertically by means of a bell crank type linkage and move it into the machine in a horizontal plane. The transfer mechanism then moves vertically downward and places the hot bar in the station two fixture. The transfer mechanism subsequently moves outward from the machine to starting transfer position.

In station two, the four bends and contours are made on the hot bar by means of an overhead ram and an underslung die set. To begin forming operations, the ram moves downward and forms a concave contour in the bar. With the ram still in the down position, a hydraulically operated center die then moves up and produces a curve in the center section of the bar. Two hydraulically operated cone benders then form a 90-deg offset angle on the bar ends. Two hydraulically operated edge benders then further displace the bend to required dimensions in the tangent plane of the cone.

After forming operations are completed, the ram and die set retract and the bumper support is transferred to station three where it is placed on a chain conveyor which carries the part to a salt quenching tank. *Expert Automation Machine Co.*

Circle 42 on postcard for more data

## Soluble Cutting Oil

GULFCUT heavy-duty soluble oil is a new emulsified cutting oil which is said to substantially increase the efficiency of heavy machining and grinding operations. Chemically-active compounds protect against foaming and welding; and wetting-out properties are high, providing effective cooling. Other stated benefits of the oil, which contains a stable petrochemical emulsifier, include the obtaining of superior surface finish, added protection from rust and corrosion, longer tool life, heavier cuts, and higher speeds and feeds. *Gulf Oil Corp.*

Circle 43 on postcard for more data

## Portable Power Pump

PROVIDING two-speed, fast-approach operation, a new portable high-pressure hydraulic power pump has been designed for a variety of hydraulic power applications such as pipe and conduit benders, knockout punch drivers, rams, jacks and presses. Designated the No. 798-AC-SA power pump, it is driven by a ¾-hp, 115/230-v electric motor.

The pump, which features fast-approach, two-speed action, will, as the ram load increases, automatically change over to high pressure. Three position control—advance, neutral and return—is provided, with neutral holding the ram pressure and position while the motor is running. Valving provides high-pressure advance only and allows spring action, manual, or gravity return of the ram. Capable of working at a continuous pressure of 6000 psi, the pump can develop up to 10,000 psi intermittent pressure.

*Greenlee 798-AC-SA power pump*

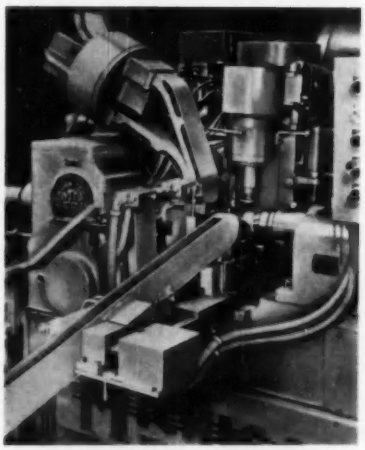
This unit is also available powered by an ac-dc universal electric motor or a four-stroke gasoline engine. All models are also offered with a four-way valve for two-direction action, providing both hydraulic advance and return of the ram. *Greenlee Tool Co.*

Circle 44 on postcard for more data

## Automatic Parts Feeder

FOR feeding parts into a hobber properly positioned for back-to-back hobbing, a new automatic orienter has been added to the Michigan Tool Co. line of automated loading and unloading devices. The unit is particularly applicable to gears with extended hubs and similar parts which tend to support each other when mounted in pairs on an arbor. It is said that by the use of this parts loading method, output of a single-spindle hobber can be practically doubled. Hob life is also extended.

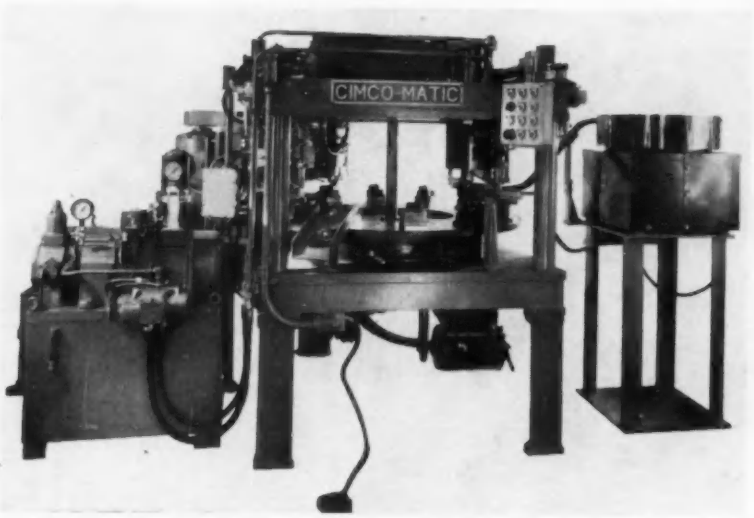
In operation, all parts enter the drum-type alternator aligned the same way. The parts are gravity fed into the drum from an overhead distribution system, a positive stop permitting only two parts to enter the alternator at any one time. Limit switches, actuated by the machine cycle, move spring-loaded pawls which release a swinging arm to rotate one of the two parts 180 deg. The parts are then in a back-to-back position but on opposite sides of the drum. Two escapement mechanisms allow each one to slide down its independent track. The tracks merge at the input end of the machine feed slide, where the parts drop into a slot in proper position to be mechanically shuttled to the arbor of the machine.



*Michigan Tool automatic parts feeder alternates parts, like gears, for back-to-back hobbing*

Set up as illustrated for the back-to-back hobbing of small pump gears on a Model 1445 Michigan hobber, the parts alternator does the parts feeding in a loading time of four seconds for two gears.

Circle 45 on postcard for more data




*Cimco series 4C54 special assembly machine for ball joints features two spinning operations in a 10-step sequence of assembly involving eight different parts*

## Assembly Machine Does Spinning Operations

TWO spinning operations, ordinarily assigned to other equipment, are included in the operation sequence of the Cimco Series 4C54 special assembly machine. Designed for assembly of upper ball joints, the machine has an operating cycle time of six seconds, permitting a production rate of 600 pieces per hour at 100 per cent efficiency. It handles both the left-hand and right-hand ball joint assemblies by the interchanging of one rest pad and one diamond locater in each of the 12 fixtures.

The spinning operations are scheduled for the sixth and seventh steps of a 10-step operation sequence. At station 8 the Cimco spinning unit rough spins a ball joint socket (a steel forging) over a closing disk while a mist spray lubricates the spinning rolls. At station 9, a second spinning unit finish spins the socket. The assembly is greased through the fitting at station 11; and finished part is automatically ejected at station 12.

The machine is equipped with a Model 36Lt-12 Cimco index table and a special 54-in. dial plate. Other equipment, in addition to the spinning units, includes two greasing units, a hopper feed unit, and an automatic ejection unit. *Cimco Engineering Co.*

Circle 47 on postcard for more data

## Magnetic Belt Conveyor

ANNOUNCEMENT has been made of a new magnetic belt conveyor designed to transport ferrous loads at angles up to 90 degrees. Loads are carried on a thin rough-surface belt which slides over a metal bed containing permanent Alnico magnets. The like poles of all magnets are connected with strips and the attraction of these strips holds the load on the belt. Because the belt must be slack to conform to the lower vertical curve, a positive-acting drive consisting of a right angle gearhead motor with a roller chain to drive the conveyor headshaft has been designed and is included in the machine. *The Alvey-Ferguson Co.*

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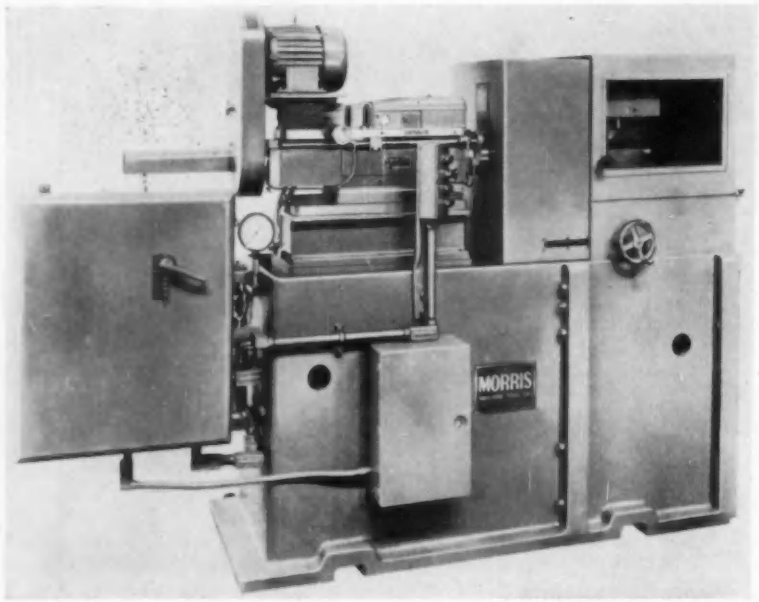
*Alvey-Ferguson conveyor*




*Morris automatic gun drilling machine has infinitely variable speeds and feeds, automatic load control, and built-in high-pressure coolant and chip removal system. The fixture shown is for drilling cylindrical parts. It has V-block holding devices which may be interchanged to accommodate 21 different size pieces.*

## Standard Automatic Gun Drilling Machines

NEW standard automatic gun drilling machines developed by The Morris Machine Tool Co. are said to increase efficiency in many phases of gun drilling operations. The one-way and two-way models provide infinitely variable spindle speeds and feeds, adjustable automatic load control, and a coordinated high-pressure coolant and chip removal system. The new machines are stated to be particularly efficient in drilling deep holes ⅛-in. diam and up.

Spindle speeds up to 8000 rpm are obtained by a simple adjustment. Feeds up to 40 ipm are possible, with infinitely adjustable feed stroke available in six-inch or nine-inch stroke. The entire drilling unit is adjustable on a sliding base obtainable for six or nine-inch movement. Morris Air-Oil-Matic drill units use oil for control and air for powering the stroke.

The adjustable load control senses conditions that might endanger the operation. It automatically detects dull drills, chipped drills, hard spots in the material, insufficient coolant, etc., instantaneously reversing the quill under such conditions.

To make possible coolant pressure up to 1000 psi, the standard machine is equipped with a system consisting of a rear spindle coolant inductor, high pressure pump and gage, and filters. The coolant shuts off automatically on return stroke, and can be switched off, together with the spindle motor, to permit accessibility for setup. Chip disposal trough is 12 in. wide.

The quill is supported at both the front and center of the drilling unit, for straight line motion during feed stroke. Its design allows feeding of two or more drills into the same part at the same time.

Circle 48 on postcard for more data

## Improved Nibbler

NEW design features have been incorporated into Fenway's improved model HN portable nibbler to make it suitable for cutting titanium, stainless, and all types of non-ferrous metals, without distortion on either side of the cut, according to a recent announcement.

The tool cuts up to 55 ipm, with minimum radius of six inches. For three-inch radius a special die holder is available for use on 12-gage stainless steel and lighter metal. Weighing only 13 lb and measuring 13 in. in length, the HN nibbler operates on 115-v ac or dc, with 220-v optional at extra cost. *Fenway Machine Co.*

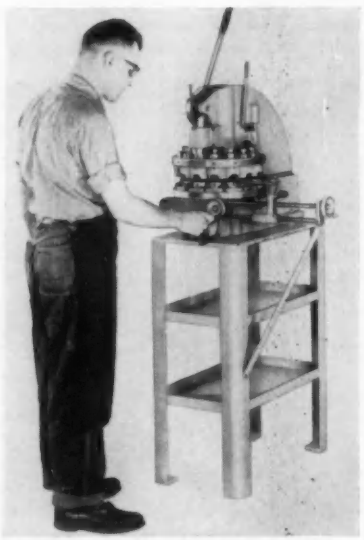
Circle 49 on postcard for more data

## Turret Punch Press

DESIGNED for use in short-run production, a new four ton, 12-station hand-operated turret punch press will pierce and blank holes from 1/16 to 2 in. in sheet material of various kinds. Micrometer type back and sidegages are standard equipment. These gages, called Micro Twin, can be set at any point from maximum adjustment to the center of the smallest punch in 60 sec.

Because clearance as small as 0.002 in. is offered on the punches and dies used in this press, holes can be punched in thin sheet material without distortion or burr. Stripper plates are also provided as standard equipment for each of the 12 stations.

Capacity of the machine enables a two-inch hole to be punched in 16-gage mild sheet steel, and a ¼-in. hole in 3/16-in. steel plate. Other specifications are: depth of throat 12-in.; overall height 25 in., width 30 in., depth 20 in.; maximum travel of lead screw on side gage 18 in.; travel of back gage limited to 12-in. depth of throat.



*Di-Acro 12-station hand-operated turret punch press features micrometer gaging and burr-free punching*

A wide selection of round, square, oval, rectangular and notching punches and dies is available for use with the machine. Choice of six different clearances are obtainable in the punch and die sets. *O'Neil-Irwin Mfg. Co.*

Circle 50 on postcard for more data

## Automatic Screw Driver

CAPABLE of driving screws and nuts up to 5/16-in. thread size at speeds up to 3600 per hour, a new automatic screw driver has convenient torque adjustment and safety sensing. Operating on normal 80-lb air line pressure, the Dixon Auto-Driver's air motor has an adjustable torque range of from 10 to 108 lb-in. Head dimensions of the new unit are only 21 in. high by 3¼ in. wide by 5 in. deep, and it can be installed at single or multiple stations with fixtures, feeders, feed track, and transfer or indexing tables. It may be located at adjacent stations on a five-inch radius dial indexing table having up to 12 stations, or nested on 3¼-in. minimum centers along an in-line transfer table.

*Dixon Model SD-1 Auto-Driver*

The new Auto-Driver, Model SD-1, operates at 2000 rpm and has a three-inch stroke. Other speeds and strokes are available. The unit is offered by itself, for arrangement with other components. It can also be supplied with machine base equipped with double T-slot column to simplify mounting and locating of screw driver in relation to the fixture. The driver is easily interlocked with fixture indexing. No extra limit switches are required since the Auto-Driver is a completely automatic cycling mechanism. Addition of a small DPDT relay in the control circuit and an electrical signal are all that are needed for electrical adaptation to automatic assembly.

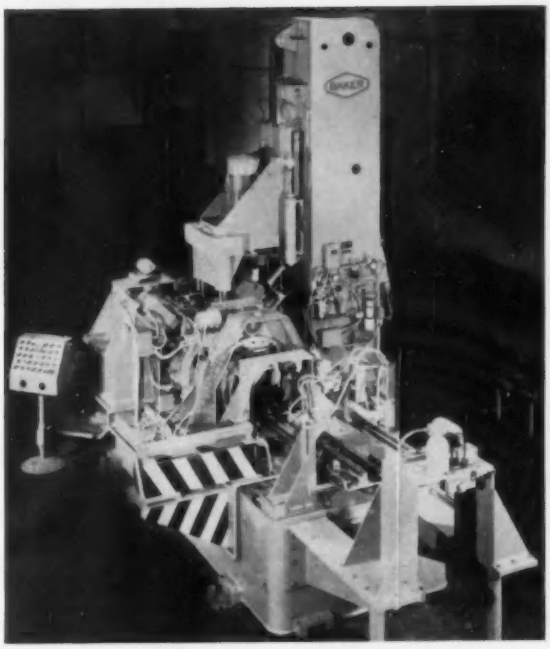
Operation of the unit is simple. A graduated thumbnut permits quick change of torque setting to suit work requirements. A hand-operated poppet valve is provided to initiate single cycles for setup. In automatic operation, a solenoid poppet valve initiates the automatic cycle with an automatic control signal to operate return poppet when screw is properly torqued, stopping motor, and retracting driver to complete cycle. If a screw is not placed or properly torqued, automatic sensing interrupts the cycle. *Dixon Automatic Tool, Inc.*

**Circle 52 on postcard for more data**

## Machine Checks and Drills Cylinder Blocks

*Designed to determine whether V-8 cylinder blocks have any walls that are too thin as a result of cores shifting during molding, the Baker machine automatically checks wall thickness and locates the block to maintain the desired minimum. If this wall thickness cannot be maintained, the block is rejected and painted. If the block is acceptable, the vertical head advances and drills two manufacturing holes in the block. The head then withdraws and the block is shuttled to the next position for reaming. Transfer is mechanical through a ball nut and screw. (Baker Bros., Inc.)*

**Circle 51 on postcard for more data**



## Tool Holders

AN improved tool holder design and an increase in the number of tool holder styles for use with cemented carbide indexable inserts were recently announced. The tool holders now have an improved clamp which has a positive gripping action and gives greater chip clearance. The clamp can be used with or without chip breaker. The clamp screw is accessible from both the top and bottom of the holder, an advantage when using a rear tool carriage. The number of different styles was increased by 26 with the addition of positive rake cutting tool holders. Ten new positive rake inserts have also been added to the line. *Carmet Div., Allegheny Ludlum Steel Corp.*

**Circle 53 on postcard for more data**

*Pictured are six of the more than 116 styles and sizes of tool holders now being distributed by Carmet Div., Allegheny Ludlum Steel Corp.*

Continued on Page 134

# MACHINING PERFECTION always starts with the right steel

*Pick exactly the right steel for any job from J & L's complete cold finished line*

## *"Machines window pivot pins 35% faster with J & L C-1117 leaded steel"*

J&L STEEL

**Jones & Laughlin**

. . . a great name in steel

Conversion to J&L "C-1117" leaded steel from regular "C-1117" steel cut total machining time 35% for this pivot pin used in linkage for turning quarter windows. Cycle time was cut from 3.5 to 2.6 seconds for this part machined from ⅜" cold finished round. J&L leaded steels give you higher cutting speeds, longer tool life, improved finish. Call your local distributor or write to Jones & Laughlin, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

# Free INFORMATION SERVICE

**Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.**

USE THIS POSTCARD

FREE LITERATURE

### Place Bolts 1

Principles of operation, engineering standards and tightening information for slotted-type place bolts used as substitutions for conventional bolts and cap screws on connecting rods, main bearings, flywheels and as piston pin lock screws are contained in an eight-page edition just released by *National Machine Products Co.*

### Bearings and Rod Ends 2

Features and engineering data on a line of spherical bearings and rod ends are contained in Bulletin 257. *Sealmaster Bearing Division, Stephens-Adamson Mfg. Co.*

### Automation Retooling 3

Contained in Bulletin 117, eight pages, is an explanation of how standard automation units can be retooled for different operations. *Baker Brothers Inc.*

### Limit Controllers 4

Described in a four-page folder are two limit controllers applicable for automatic control of weight, size, force or other physical quantities. *Daytronic Corp.*

### Gear Chucks 5

The function of chucking equipment involved in finishing gears by automation is described and illustrated in a folder issued by *Garrison Machine Works, Inc.*

### Wiring Raceway 6

Now available, Bulletin S-302, describes a new Panel Channel wiring raceway made of reinforced phenolic. Self-extinguishing without any afterglow, the new product is adaptable under the high temperatures normally encountered in panelboards. *Stahlin Brothers, Inc.*

### O-Ring Handbook 7

Handbook 5700, 160 pages, contains full design data on the selection and application of synthetic rubber O-ring seals. *Parker Appliance Co.*

### Multi-Slide Machines 8

Bulletin 15, 15 pages, explains the application of multi-slide automatic machines designed for the production of stampings from coil stock. *U. S. Tool Co., Inc.*

### Carbide Cutting Tools 9

Three new carbide cutting tools now being offered are featured in a new 36-page catalog prepared by *Super Tool Co.*

### Machining Tool 10

Catalog VM-57, 27 pages, explains and illustrates the application of a new portable tool designed for milling, boring, shaping, slotting, grinding, and other related machining operations. *The Dunmore Co.*

*(Please turn page)*



VOID After Dec. 1, 1957 10/1/57

Circle code numbers below for Free Literature, New Plant Equipment, or New Product Information

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## Automatic Loader 11

Information on a new line of automatic loaders for heat-treating furnaces, plating lines, and continuous tumbling is contained in four-page bulletin 20. *Michigan Crane & Conveyor Co.*

## Steel Bars 12

A wall chart lists 241 AISI grades of cold-finished steel bars and gives their chemical analysis and machinability ratings. *LaSalle Steel Co.*

## Conveyors 13

Pneumatic conveyors for handling dry bulk materials are described and illustrated in 32-page bulletin 530. Typical installations are also shown. *Dracco Corp.*

## Test Equipment 14

Bulletin 253, 16 pages, describes 55 standard and custom machines made for aircraft system and component testing. *Sprague Engineering Corp.*

## Detergent-Inhibitor 15

Paranox 302, a new type detergent-inhibitor for engine lubricating oils, is discussed in a 14-page technical report. *Enjay Co., Inc.*

## Welding 16

"Recommended Practice for Repair Welding and Fabrication Welding of Steel Castings" is a 52-page reference manual on welding methods which has been made available through the courtesy of *Tempil Corp.*

USE THIS POSTCARD

## Metal Plating 17

Electroplating, anodizing and other treatments of aluminum such as stripping, cleaning, pickling and bright dipping are described and illustrated in seven-page bulletin 61 which includes discussions on various types of plating equipment. *Frederic B. Stevens, Inc.*

## Mechanical Tubing 18

Bulletin TB-340A, seven pages, describes the characteristics of seamless mechanical tubing for the production of hollow cylindrical parts. *The Babcock & Wilcox Co.*

## Molding Components 19

Silicone molding compounds featuring low thermal conductivity and high temperature strength-to-weight ratio, are described in a four-page, illustrated brochure. Code #7-603. *Dow Corning Corp.*

## Vapor Degreasers 20

Batch type vapor degreasers of several sizes and types are described in a 15-page illustrated brochure released by *Phillips Mfg. Co.*

## Die Sets 21

Catalog 70-A, 20 pages, gives sizes, prices and other ordering data for a line of die sets—both standard two pin series and rear two pin rectangular series. *E. W. Bliss Co.*

## Air Gages 22

Catalog 574, 32 pages, gives details on a complete line of precision air gages and accessories. *Federal Products Corp.*

## Flushing Solvent 23

Six-page folder 2-408-C describes the performance of an additive cleaning solvent that flushes lubricating and hydraulic systems during machine operation. *E. F. Houghton & Co.*

## Burnishing Compound 24

Two page report B-6644 furnishes information on Oakite FM-103, a new barrel compound developed for finishing brass, copper, nickel, silver, gold, and mild and hardened steel parts. *Oakite Products, Inc.*

## Gear Drives 25

Contained in a 186-page handbook is information on the proper selection of drive gears. Dimensions of speed reducers and of spur, bevel, spiral, helical, and worm gears are also included. *The Ohio Gear Co.*



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USING

# DU PONT ELASTOMERS

neoprene · Hypalon®

in design

## New neoprene hinge cuts installation time on bus door from one hour to 15 minutes

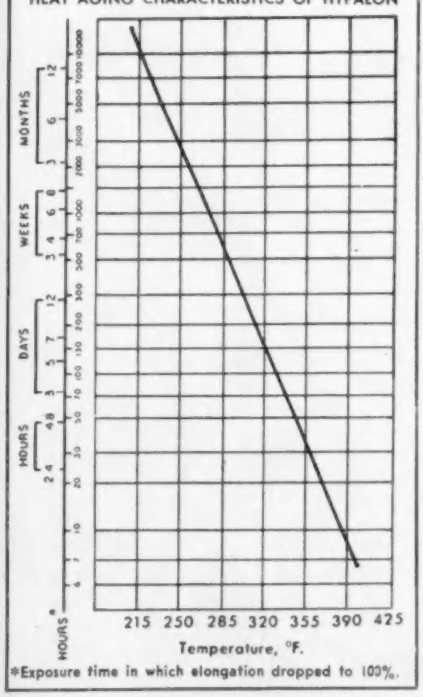
### Parts of HYPALON have exceptional heat resistance

Compared with other kinds of rubber, HYPALON shows unusual resistance to hardening at elevated temperatures (250°-350° F.). This means an extra-long service life for belts, hose, gaskets and other parts exposed to engine heat.

The graph below indicates heat aging characteristics of HYPALON. It shows, for example, that compounds of HYPALON will retain 100% elongation after three weeks' *continuous* exposure at 285° F., three months at 250° F. and almost a year at 212° F. Longer service life can naturally be expected where temperatures are intermittent.

Other advantages of HYPALON that are useful in automotive design include its outstanding resistance to sunlight and weather and complete ozone resistance. HYPALON, Du Pont's newest synthetic rubber, can also be made in a variety of light-stable colors. Mail coupon for more details.

HEAT AGING CHARACTERISTICS OF HYPALON



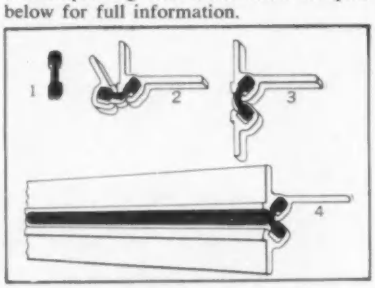

*Exposure time in which elongation dropped to 100%.

Neoprene hinge permits door replacement in 15 minutes. Only 2 pins are required to hold the door securely.

A new neoprene baggage door hinge has been developed by a coach manufacturer to replace metal piano hinges which required 80 rivets per door for installation. With 6 to 10 doors per coach, savings in time and labor costs have been significant. Where installation of piano hinges involved one hour per door, the neoprene hinge is installed in 15 minutes. Two pins drilled into the neoprene strip are all that's required to secure the door after it has been slipped over the hinge.

Neoprene was the logical choice for the hinge because of its exceptional resistance to aging and flex cracking. In laboratory tests, it withstood 1½ million flexing cycles without damage. In service, neoprene withstands the deteriorating effects of sun and weather, ozone and oxidation. Under tension at all times, the neoprene hinge also serves as a seal to keep the elements out of the baggage compartment.

Neoprene's balanced combination of properties makes it practical for a variety of automotive uses. Hose, gaskets and flexible couplings are just a few. This Du Pont synthetic rubber offers many other opportunities for designing new products and improving old ones. Mail coupon below for full information.




1. Hinge 2. Hinge open 3. Hinge closed
4. Hinge makes moisture-tight seal open or closed.

DU PONT REG. U.S. PAT. OFF.

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☐ Send me a free copy of *The Du Pont Elastomers* (a review of properties of neoprene and HYPALON).

☐ Add my name to the free mailing list of the *Elastomers Notebook* (contains articles based on uses of Du Pont elastomers in industry).

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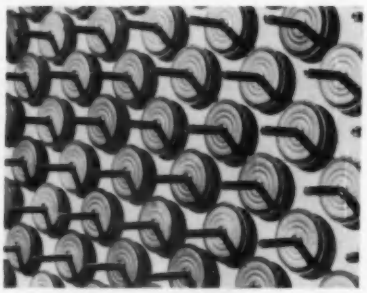
# NEW PRODUCTS
## AUTOMOTIVE-AVIATION

*FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89*

### Pressure-Sensing Units

Pressure-sensing metallic diaphragms, in a new series recently announced, are being offered in two forms: Conventional, for application in altimeters, aneroid barometers, air speed indicators and pressure gages. And nested, for applications requiring over-pressure resistance to absorb high pressure changes which normally tend to collapse conventional metallic diaphragms.

Each element is completely resistance-welded. They are available in Ni-Span C and 17-7PH, as well as in other stainless steel alloys and selected weldable metals. The metallic diaphragms are obtainable in sizes ranging from under one inch to over



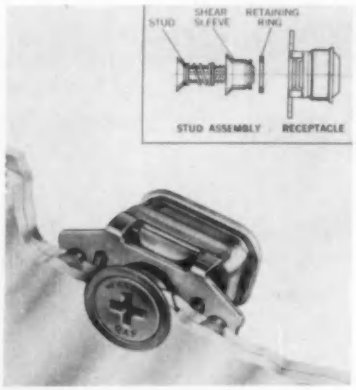
three inches in diameter, with a hysteresis deviation of less than ¼ per cent. *Bellofram Products Corp.*

Circle 60 on postcard for more data

### Stressed-Panel Fastener

Intended for use on load-carrying panels in aircraft and other applications where quick access to service areas is required, a new "quick-action" stressed-panel fastener will withstand high shear and tensile loads and may be locked positively in less than one-half turn. The device also compensates for sheet separation resulting from warpage or deformation in the panels being secured.

Called the Waldes QAF, the fastener has two major components: a retained stud assembly, consisting of




a stud, shear sleeve and retaining ring; and a receptacle assembly (shown in illustration insert). The stud assembly, available in both a flush and protruding-head type, is held in the panel by the retaining ring; and the receptacle assembly is riveted to the air frame (as indicated in the cutaway showing the device mounted and locked in position). The fastener is engaged by inserting the stud into the receptacle by hand or with a screwdriver. An audible click indicates the stud has been secured in a split nut in the receptacle and that the panels are held in place loosely. The split nut moves in a tapered housing; and as the screw is turned the nut is wedged into the narrower part of the housing until it is locked in place.

The new fastener is currently available in a ¼-in. diam stud size, and the stud is made in four lengths to accommodate a total sheet thickness ranging from 0.116 to 0.499 in. In the NAS547 No. 1 size it has a tensile load capacity of 4000 lb, and ultimate shear load capacity is about 7000 lb. *Waldes Kohinoor, Inc.*

Circle 61 on postcard for more data

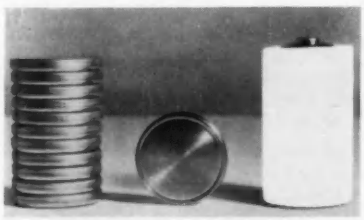
### Lightweight Truck Rim

The development of a new lightweight truck rim that weighs 8 to 12 per cent less than most standard rims was recently announced. It is stated that a tractor-trailer unit equipped with 10 of the new rims would weigh about 120 lb less than if it were equipped with standard rims. The design will be known as the Firestone Challenger two-piece rim. Of simplified construction, there is only one piece to remove when changing tires. It is intended for use with tubed tires. *Firestone Steel Products Co.*

Circle 62 on postcard for more data

### Small Battery

Only slightly larger than a half dollar, a button cell battery recently introduced was developed for miniature and sub-miniature electrical and electronic applications. Features include hermetic sealing, low internal resistance and high discharge rate, and ability to be recharged. Operating at normal temperature ranges, the two sizes of button cells each have a nominal voltage of 1.2. The cells are of the nickel cadmium type, made



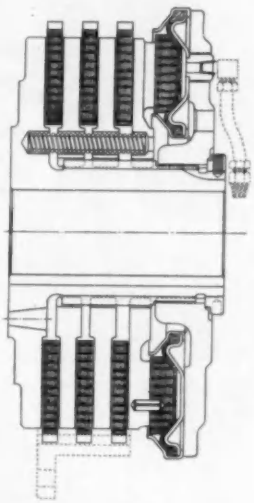
with patented sintered plates. Two or more cells can be stacked to obtain a battery of the desired voltage.

The VO .25 provides 250 mah of energy, is 1-⅜-in. diam and 3/16-in. thick, and weighs about ½-oz. The VO .5 provides 500 mah of energy, is 1-⅜-in. diam and 5/16-in. thick, and weighs about ¾-oz. For short periods of time, current up to 15 times the nominal value of the cell can be withdrawn. The cells are easily recharged by a constant current equal to 1/13th of their nominal capacity. *Gulton Industries, Inc.*

Circle 63 on postcard for more data

## Air Clutches

Production of new 8, 10 and 11½-in. air clutches as additions to the PO air clutch line has been announced. The new models, suited for machinery where high torque capacity and long life are a requirement, are available in triple-plate, double-plate and



single-plate construction and have a maximum torque capacity of 3503 lb-ft.

A cartridge type diaphragm, constructed of neoprene reinforced with nylon, is said to eliminate leakage, provide uniform torque and automatically compensate for wear without adjustment. Thick cast-iron center plates are utilized for maximum heat distribution. The clutches, using air pressure to 130 psi, are adaptable to remote control of various types of equipment such as drilling rigs, machine tools and tractor winches. *Twin Disc Clutch Co.*

Circle 64 on postcard for more data

## Gold Coating

The development of a dipping process which imparts a gold coating to various metals without the use of current or special equipment, was recently revealed. Called Atomex, the process is said to work by ionic displacement in which the base-metal surface is attacked chemically and sheds atoms into the bath which are replaced by atoms of gold from the bath.

The bath is prepared by mixing a 200-cc unit of concentrate, containing ½-oz troy of fine gold, into a gallon of water. Any type of container suitable for slightly acid or alkaline solutions can be used. The only controls necessary during the process are temperature and pH.

Coatings up to 10 millionths thick can be applied to most metals, the company states. Applications include automobile trim, clock assemblies, radio knobs, printed circuits, and electrical connectors, in addition to jewelry. *Baker & Co., Inc.*

Circle 65 on postcard for more data

## Aluminum Paint

Alumatone No. 100 is a ready-mixed aluminum paint which is said to air dry in about three minutes with minimum smudging and no lifting of undercoats. It was developed particularly for assembly lines requiring fast-drying paint films. The material is claimed to have fine color brilliance, and to give a tough, smudge-resistant coating which has good adhesion to metals, plastics, glass, rubber and wood. It is formulated from synthetic thermoplastic resins and 325 mesh aluminum pigment. The paint is stabilized to prevent discoloration during storage. Coverage is about 650 ft per gallon. Application may be made by either brush or spray. *Alumatone Corp.*

Circle 66 on postcard for more data

## Quick-Filming Brushes

New quick-filming aviation brush grades have been developed which require no sea level break-in filming run, according to a recent announcement. After proper seating the brushes are ready for service at practically any altitude. The immediate-filming feature has not entailed any sacrifice of other essential brush characteristics. Many characteristics have actually been improved, the company claims.

Stability in such factors as brush temperature, field current and commutation is maintained under a wide range of speed, load, temperature and altitude variations; and the brushes are said to assure smooth, well-filmed commutators without grooving.

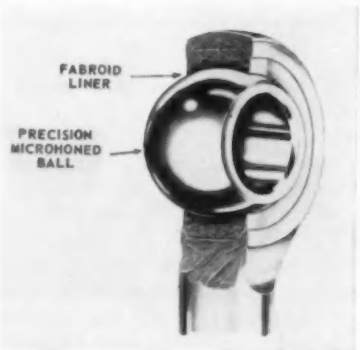
The quick-filming brushes are available in a wide range of contact drop levels, with various degrees of high-altitude treatment, and in types, grades and sizes for most equipment. The quick-filming treatment is noncorrosive and lends itself to silver-soldering rivet connections where needed. *Stackpole Carbon Co.*

Circle 67 on postcard for more data

## Self-Lubricating Bearing

To be marketed under the trade name of Fabroid, a new type of self-lubricating bearing is a composite structure consisting of two fused layers. The bearing face is a weave of Teflon fibers interwoven on the back with glass fibers. The back-up layer is a weave of glass fibers impregnated with thermosetting phenolic. These two layers are bonded and cured at elevated pressures and temperatures, giving a dense lattice of Teflon fibers facing the bearing surface, supported by an interlinked glass-phenolic structure.

One of the most promising forms of application for this material is the self-aligning bearing or rod end. The Fabroid liner is preformed by a draw-




ing operation and bonded to the inside of the retainers. Two retainers are assembled around the ball and pressed into the outer ring of the bearing or into the body of the rod end. A lip is then spun on the outside of each retainer, and the entire assembly cured at elevated temperature and pressure. This gives a full contact area conformity between the spherical surface of the ball and the Fabroid liner.

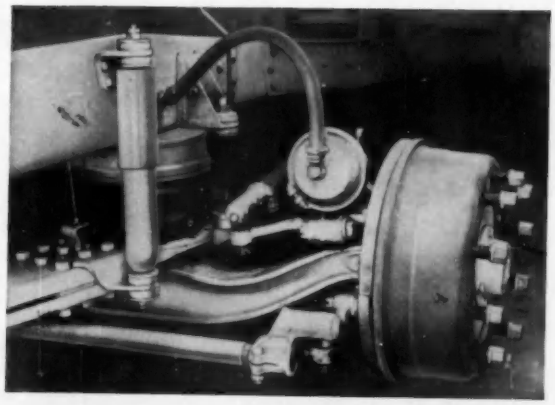
The maker reports that the bearing has a low coefficient of friction, Tests indicate that its lubricating properties are extremely good, showing cf values within certain ranges of surface speed and unit pressure as low as 0.01. In no case, throughout the range of temperatures from —65 to 400 F, did the cf exceed 0.04. Absence of galling is another of its stated qualities. *Micro-Precision Div., The Micromatic Hone Corp.*

Circle 68 on postcard for more data

# Details of the Pneuride Air Suspension System

THE Pneuride air suspension system for trucks, developed in Britain by the Dunlop Rubber Co., features a leveling valve on each wheel that automatically compensates for vehicle loading and maintains a constant chassis height without being affected by normal spring movements caused by road irregularities or roll on sustained turns.

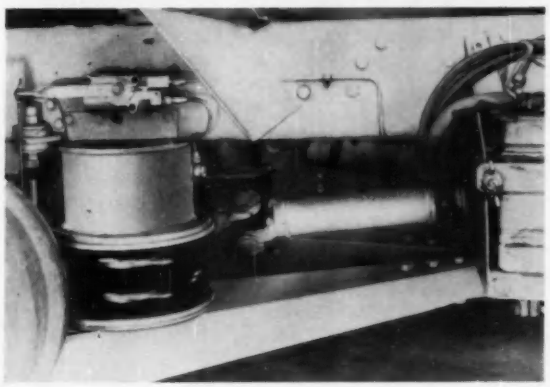
The valves, placed between the rubber-nylon bellows and the common supply cylinder, incorporate a delay device which admits or exhausts air only after expiration of the predetermined delay period. An average setting for trucks and coaches is stated to be about eight seconds. The delay functions only during valve-opening, closure occurring immediately upon return to mid-position.



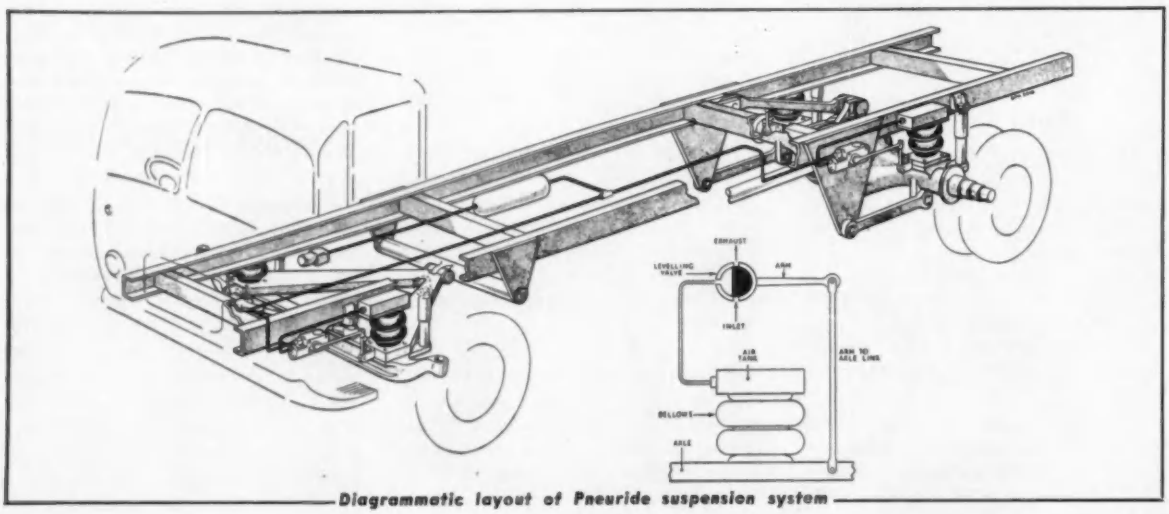
***Above right—Pneuride suspension unit as applied to the front axle. Leveling valve is inside the chassis member.***

The system provides constant riding characteristics and the same degree of progressive stiffness under all payload conditions. Conventional shock absorbers are used, although snubbers to prevent "bottoming" are unnecessary.

Each bellows is connected to an air capacity tank which increases the volume of air acted upon by the spring deflections, thus reducing the rate of the spring. The tank may be integral with the spring, or located elsewhere and connected by piping. It is stated that suitably sealed frame-members or radius arms may be adapted as capacity tanks. Maximum inflation pressure is normally 100 psi.



***Dunlop air spring fitted to the rear suspension of a truck. Leveling valve is at the upper left, directly above the air capacity tank.***




***Diagrammatic layout of Pneuride suspension system***

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# STUDEBAKER

## ENGINES

STUDEBAKER-PACKARD CORPORATION...one of the leading engine manufacturers selects and distributes Perfect Circle chrome rings for authorized replacement service

# PERFECT CIRCLE

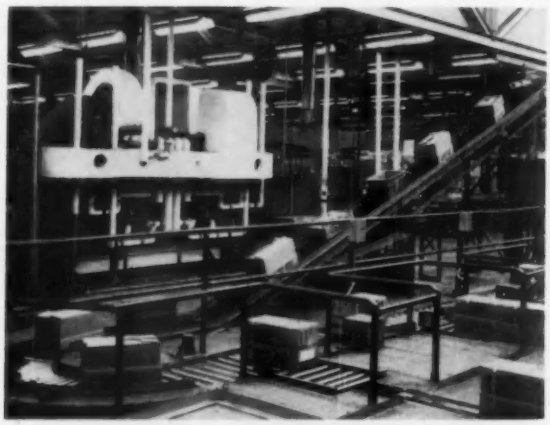
**2-in-1 CHROME PISTON RINGS...** *the standard of comparison*

# AUTOMATION NEWS REPORT

**AUTOMATIC CONTROLS**

**PRODUCTION—VEHICLES—AIRCRAFT**

**By Samuel Cummings**



***Conveyor at Timken's Bucyrus shipping center makes 180-deg turn as it begins ascent to transfer station. Electric eyes located at strategic points on the line control the movement of packages.***

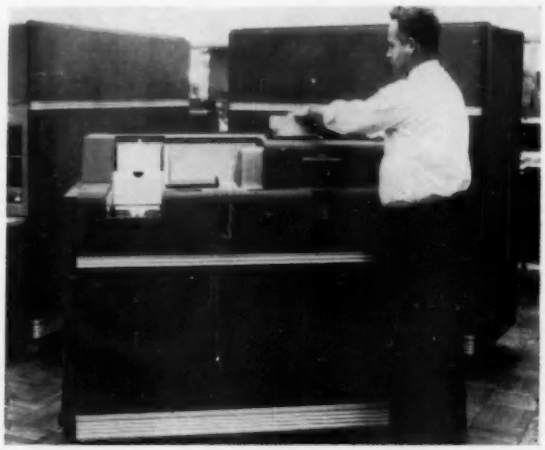
## MECHANIZED SHIPPING CENTER

Timken Roller Bearing Company's new shipping center at Bucyrus, O., plant represents a new approach to inventory control, production scheduling, storage and the processing of customers' orders. Designed and built within a year's time, the Shipping Center now handles 95 per cent of the Timken Co.'s bearing shipments. Over 10 million pieces are handled and shipped each month by the packaging and handling equipment in the highly mechanized warehouse.

The entire operation is centered around an IBM 650 Computer located in the Canton, Ohio, office. The major task of the computer is to keep track of inventory, scheduled production and unshipped customer orders. This makes it possible to determine quickly whether or not a customer's shipping date request can be met.

In addition to the computer there are many other modern office machines which, when linked together, form a completely integrated system.

Before the new system was put into operation each manufacturing plant had its own shipping department. Orders received in Canton were routed to the proper plant. If it was a split order, one that requested several different sizes, the customer might receive bearings from several different plants. If one shipment was late, the customer had to hold the entire order until the pieces arrived. The shipping center eliminates this problem since the order is shipped from the one location. No part of the order is shipped until the entire order is on hand.



***IBM 650 computer is heart of Timken Co.'s new Bucyrus shipping center.***

Product is received and stored by a system of conveyors, lift trucks and special equipment. In addition to making the work easier for the more than 220 employees who operate the center it greatly facilitates the process of handling. Pallet unloaders, special lift trucks, packaging equipment and conveyors are an essential part of the center.

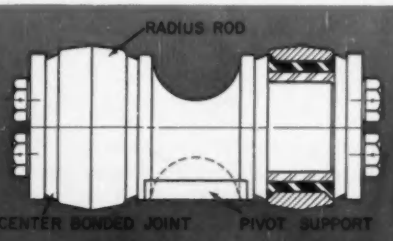
## AUTOMATIC ASSEMBLY MACHINE

An automatic assembly machine that takes orders from itself is now in production at International Business Machines Corp. The new device is used to

*(Turn to page 118, please)*

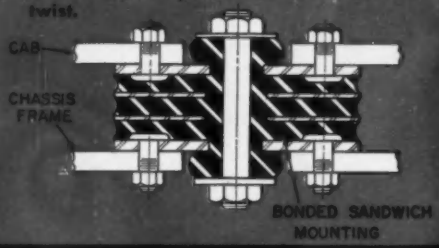
***IBM machine automatically inserts components in printed wiring boards according to instructions contained in punched cards.***

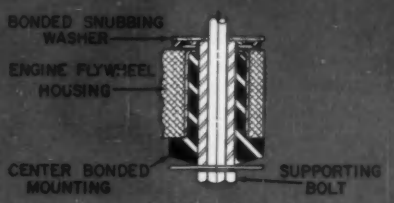
# LORD bonded rubber mountings improve automotive performance




**OFF-THE-ROAD-TRUCKS**—Terrific shocks and jolts of off-the-road equipment are accommodated by Lord lubrication-free Dynaflex® joints installed at the torque rod ends of the suspension system.

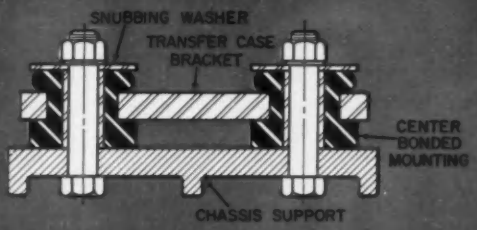
**TRUCK CABS**—Lord bonded sandwich mountings combine high strength with resiliency to provide smooth, quiet riding in truck cab by absorbing road noise and truck motion and protecting cab from chassis twist.

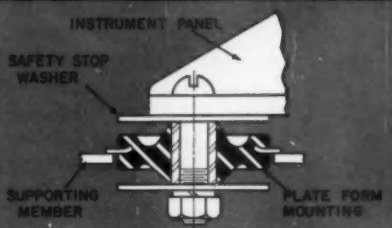



**ENGINES**—Lord center bonded mountings isolate powerplant noise, accommodate misalignment and provide more effective shock and vibration control.

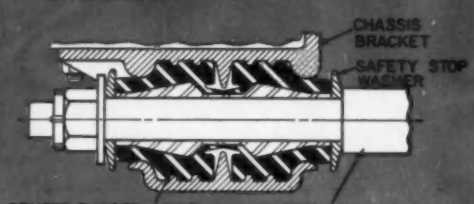
**TRUCK TRANSFER CASE**—Lord center bonded mountings eliminate noise transfer, absorb road shock and accommodate chassis twist.




**INSTRUMENT PANEL**—Supporting control panel on soft, resilient rubber mountings prevents damage from engine vibration or operational shock and extends service life of the instruments.

**TRAILER HITCH JOINTS**—Lord center bonded joints absorb road shock to provide a more secure trailer hitch and greater driver comfort.




These are only a few of the many successful automotive applications designed by Lord. Each vibration control system is engineered to meet the specific installation requirements.

Find out how Lord bonded rubber mountings and joints can reduce noise, frictional wear, metal-to-metal contact, maintenance and lubrication. Lord Field engineers are located in major industrial centers. Call or write the Lord office nearest you.

ATLANTA, GEORGIA - CEdar 7-1123
BOSTON, MASS. - HAncock 6-9135
CHICAGO, ILL. - Michigan 2-6010
CLEVELAND, OHIO - SHadyside 9-3175
DALLAS, TEXAS - Riverside 1-3392
DAYTON, OHIO - Michigan 8871
DETROIT, MICH. - TRinity 4-2060
LOS ANGELES, CAL. - HOllywood 4-7593
NEW YORK, N. Y. - Circle 7-3326
PHILADELPHIA, PA. - LOcust 4-0147

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**LORD MANUFACTURING COMPANY • ERIE, PA.**

LORD
BONDED RUBBER

*designers and producers of bonded rubber products since 1924*

# METALS

*Domestic Zinc Shipments Up. Aluminum in Plentiful Supply, But No Price Cut Is Expected. Copper Price Falls Again.*

*By William F. Boericke*

## Pickup in Steel Production

A steel pickup is underway but at no break-neck pace. Sales and production are pointed moderately upward. The general outlook is that just as September was a better month for the mills than August, so October and November will each show improvement. Forecasts for the fourth quarter production still hold between 85 and 90 per cent, with the current rate in mid-September about 82 per cent.

Confidence in the fourth quarter ahead rests mainly on increased demand for steel from the automobile makers, whose buying is steadily improving as the 1958 cars start to roll off the line. This is particularly noticeable in the call for cold rolled sheets and other light flat rolled products. In most cases quick delivery is asked for. Most steel makers are in a position to fill orders promptly, and their customers are well aware of the fact and are not getting in their orders fast enough to meet the required lead time, usually about 45 days.

Aside from the improvement in light flat rolled steel, the order pattern shows little change. Demand for heavy structurals and plate is just about as strong as ever. Wide flanged beams are said to be as much as five or six weeks behind deliveries. Oil country goods are not quite as tight as formerly. Some oil and gas companies are not over anxious to pick up their allotments of pipe. With some improvement in new housing starts, now estimated at an annual rate of 980,000 units, there has been a pickup in standard pipe used in homes. Tin plate demand has slipped with the food packing season past its peak.

Little help for steel appears on the way from the machine tool makers. Industry leaders doubt if there is any reversal of the sharp decline in orders of the last nine months. The estimated backlog of orders remains at the June figure of 4.2 months' shipments. This compares with 7.8 month backlog in July, 1956.

## Scrap Price Declines

There is some uneasiness over the decline in the steel scrap market. The price of scrap has historically usually proved a weather vane in steel. It has continued to sag in leading producing centers. Number 1 heavy melting scrap, a key grade, was down $5 a ton in Chicago from the price a month ago of $56. Yet, throwing precedent to the wind, the steel operating rate continued to increase in the face of weaker scrap markets for five consecutive weeks.

## Zinc Shipments Increase

August figures from the American Zinc Institute give some measure of cheer to producers. Domestic shipments climbed 12,500 tons over July to total 70,318 tons, up 8000 tons over the average monthly shipments for 1957 and the highest monthly rate since last December. Unfilled orders were slightly higher and slab production was lower, reflecting the cutbacks made by the leading smelters during the month. However, stocks of slab zinc remained uncomfortably high, over 149,000 tons. But the increase in stocks was the smallest for some time and producers are hopeful that demand from the die casters will bring a reduction as automobile production increases.

## No Immediate Action On Zinc and Lead Tariff

When it was evident that Congress was not going to pass any tariff legislation at this session that would boost import duties on lead and zinc, buyers resumed their wait-and-see attitude. The President has indicated he would ask the Tariff Commission to handle the matter. It is believed the zinc and lead producers will petition for the highest possible import duties, import quotas, and any other relief possible under the law. As the Administration now appears willing to approve higher duties, there is reason to think the Commission will recommend either the 50 per cent legal maximum boost on existing tariffs or a quota limit tied to market prices. Possibly both measures will be suggested. But in any event considerable time will ensue before producers will benefit. No decision is expected from the Commission before December. If the Commission makes the same recommendation as in 1954, it would make the new duty 2.1 cents a pound on slab zinc and 2.55 cents on pig lead.

## Aluminum in Easy Supply

Aluminum is in plentiful supply, but there is little danger of any price cut in pig or ingot. Conditions in the industry are wholly different from copper, and price control is more feasible, but aluminum producers are assiduously cultivating every possible

*(Turn to page 106, please)*

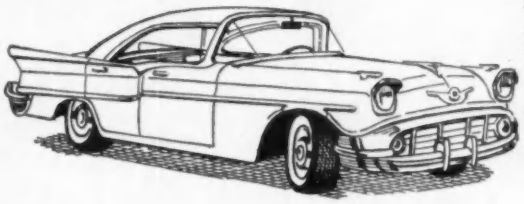
*Rapidly becoming the*

# Standard of the Automotive Industry

**INCREASES ENGINE LIFE UP TO 400%**

**STERLING'S great "Conformatic" piston with "Intra-Cast" steel ring groove liners give sensationally longer life to rings and grooves—**

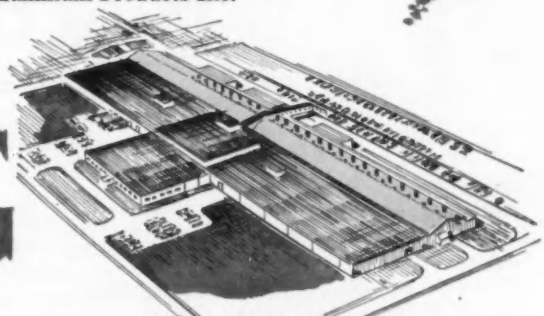
**Recommended clearances for "Conformatic" pistons are from 0 to ½ thousandth inch. This clearance is maintained hot and cold providing unbelievable bore stability.**



**Sterling's revolutionary *Conformatic* piston already has been accepted and is now being used in a number of America's finest and most popular passenger cars.**

**STERLING'S CONFORMATIC PISTON WITH INTRA-CAST STEEL LINED GROOVES**

prevents frictional horsepower loss, reduces oil consumption to an absolute minimum, and prolongs engine life up to 400%. *Intra-Cast* and *Conformatic* are registered trade names of STERLING Aluminum Products Inc.



**NEW MANUFACTURING FACILITIES FOR STERLING ALUMINUM**

120 acres! Completely new automated plant at the confluence of the Missouri and Mississippi Rivers

SA-1

# STERLING

**ALUMINUM PRODUCTS INC.**

**ST. CHARLES, MISSOURI**

**WORLD'S LARGEST MANUFACTURER OF ALUMINUM ALLOY PISTONS**

# Observations

By Joseph Geschelin

## Road Speed

By the time this item is in print we may see an announcement of a transmission-driven road speed governor for trucks. This one is a combination of a centrifugal governor valve controlling an integral governor-carburetor by means of differential pressure on a diaphragm which actuates the throttle. This arrangement will limit maximum road speed. But there still remains the problem of controlling maximum engine speed in low gear. This can be done by installing an engine-driven governor valve in the same circuit. Here is something that truck engineers and fleet operators have been looking for. And it is here right now.

## Aluminum Engines

One of the questions popped at the Edsel preview brought out the reasons why motor car producers have not yet switched to aluminum cylinder blocks. They are not worried about design problems. It is a matter of economics. The point is that aluminum blocks would entail the building of enormous die-casting machines at fantastic cost. Moreover, since the cycle of such machines is limited, one would require a number of such machines as well as the duplicate die equipment. At the moment such investment is not considered economical. Perhaps the large dis casters can give us the answer.

## Small Cars

Various estimates place the number of small foreign cars to be sold in USA this year at between 150,000 and 200,000. Of this Ford expects to sell 15,000 British Fords. As imports grow in these large proportions the market should become more important to domestic suppliers. There is the implication that if the trend persists some manufacturer will find it attractive to enter the competition. After all, the goal for the Edsel is some 200,000 units a year.

## Unitized Bodies

The fact that Lincoln is reportedly grooming its new lines with unitized bodies has brought with it fresh speculation regarding a trend to this construction. At the moment we fail to sense a trend. It is mainly a matter of economics and expediency. So far as Lincoln is concerned the management was in the happy position of designing an entirely new car and designing and building an entirely new plant. There was no penalty of any kind in the decision to go unitized. Moreover, Lincoln has no assembly plants to consider. Any other manufacturer would face the problem of changing the existing plants and assembly plants. And that poses a problem of mean proportions.

## Air Ride

Chassis design to accommodate an optional air suspension system has taken two different avenues. One family has stayed with the normal chassis arrangement and will add trailing arms and track bar at the rear, together with outboard mounting of front shock absorbers whenever air ride is specified. Another family has moved to complete interchangeability. Reportedly they will have coil springs all around and some will even mount the rear coil springs on standard trailing arms. When air suspension is specified the air bags will simply replace the coil springs at all corners.

## Engine Progress

1958 is a year of novelties in engine design. Chief of these is combustion chamber configuration. Some engines will have plane-milled cylinder heads without cavities. Some will have stepped piston domes to provide for the quench area; one we saw recently will have a wide groove milled in the head to provide for valve clearance.

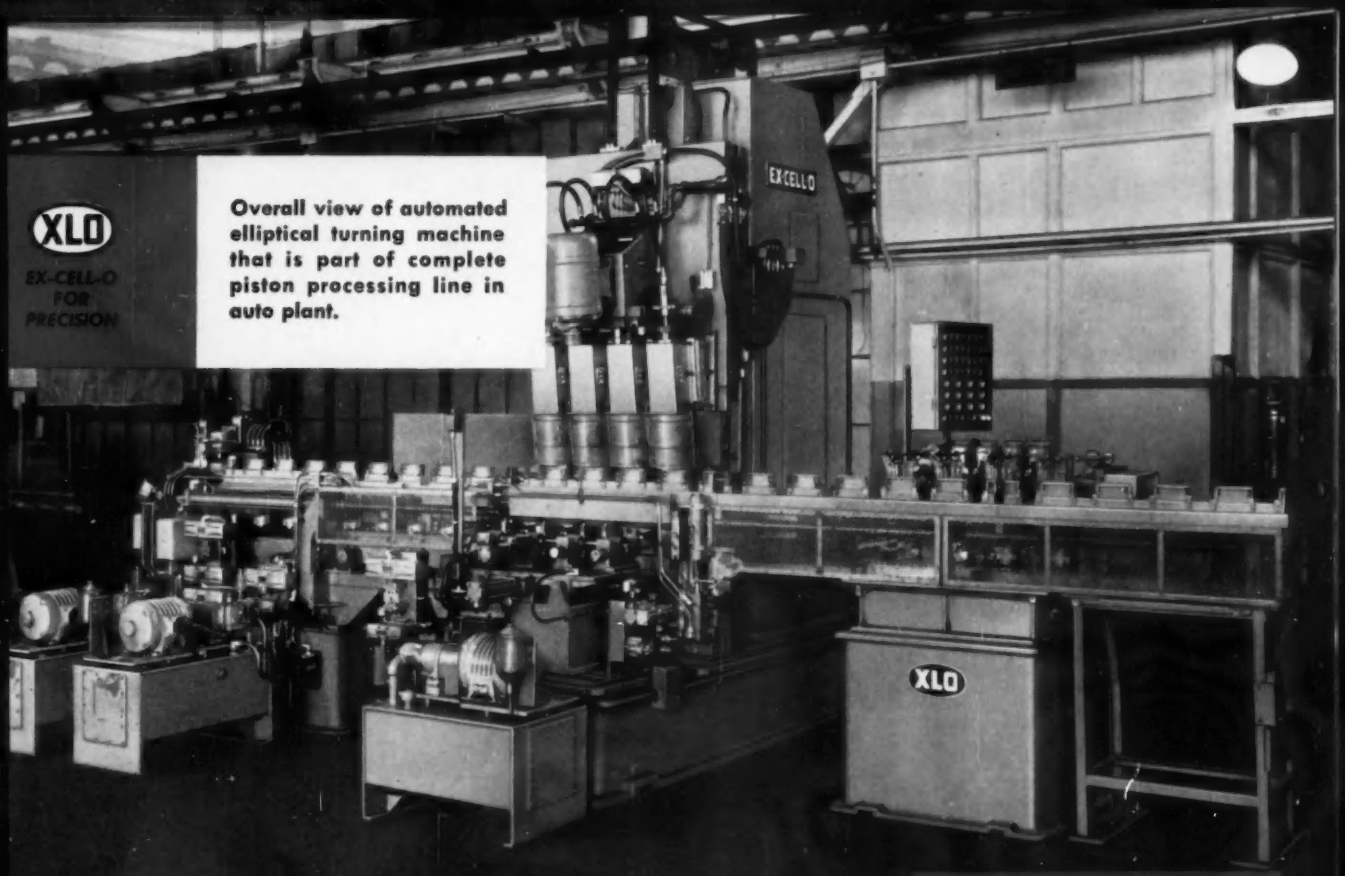
## Safety Devices

1958 will bring new emphasis upon motor car safety and safe driving. It should result in more promotion for safety belts. A variety of accessories will be offered to warn the driver at high speeds. Last year Buick introduced a buzzer to wake the driver when he reached a selected speed range. This year there will be other devices. One of these turns on a red light over the speedometer; another rings a bell. Recently Perfect Circle introduced an accelerator pedal control to accomplish the same result. They all have one common objective: to warn the driver when he reaches a top speed he selected beforehand. Certainly any of these is preferable to a governor.

## EP Lube

Volume 43, No. 6 of *Lubrication* (The Texas Co.) is devoted entirely to the matter of E-P lubes. It concludes that EP requirements of any application are hard to de-

(*Turn to page* 117, *please*)




Overall view of automated elliptical turning machine that is part of complete piston processing line in auto plant.

# Roughs and Finishes 250 Pistons per Hour

57-77

This automated Ex-Cell-O machine semifinish and finish turns an elliptical shape on automotive piston skirts at the net rate of 250 pieces per hour.

Pistons enter the machine from a conveyor, are radially located from their wrist pin holes and clamped on the ring land diameters. Four heads machine four piston skirts simultaneously. Air gaging follows the machining operation, after which pistons are ejected to another conveyor.

Write to Ex-Cell-O or contact your local representative for further information or a proposal.

**EX-CELL-O CORPORATION** *Machinery Division*
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MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • TORQUE ACTUATORS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

# • • INDUSTRY STATISTICS • •

## 1957 WEEKLY U. S. MOTOR VEHICLE PRODUCTION

*As reported by the Automobile Manufacturers Association*

| Make | Weeks Ending Sept. 14 | Weeks Ending Sept. 7 | Year to Date 1957 | Year to Date 1956 |
|---|---|---|---|---|
| **PASSENGER CAR PRODUCTION** | | | | |
| Hudson | 102 | 80 | 1,567 | 4,762 |
| Nash | 237 | 183 | 4,076 | 11,513 |
| Rambler | 1,650 | 912 | 61,150 | 54,908 |
| Total—American Motors | 1,989 | 1,175 | 66,793 | 71,183 |
| Chrysler | 445 | 1,762 | 93,224 | 79,435 |
| De Soto | 0 | 291 | 89,103 | 71,165 |
| Dodge | 0 | 676 | 220,179 | 136,443 |
| Imperial | 0 | 0 | 30,173 | * |
| Plymouth | 154 | 6,984 | 512,158 | 313,331 |
| Total—Chrysler Corp. | 599 | 9,713 | 944,838 | 600,374 |
| Edsel | 4,933 | 3,468 | 32,711 | |
| Ford | 28,207 | 25,064 | 1,125,714 | 889,019 |
| Lincoln and Continental | 353 | 366 | 27,988 | 34,688 |
| Mercury | 4,535 | 4,174 | 221,565 | 186,964 |
| Total—Ford Motor Co. | 38,028 | 33,069 | 1,407,978 | 1,110,671 |
| Buick | 800 | 4,990 | 298,474 | 418,916 |
| Cadillac | 3,376 | 2,692 | 117,991 | 114,993 |
| Chevrolet | 30,444 | 25,411 | 1,123,677 | 1,192,919 |
| Oldsmobile | 5,574 | 6,428 | 296,862 | 331,190 |
| Pontiac | 3,208 | 5,594 | 262,692 | 248,159 |
| Total—General Motors Corp. | 43,402 | 45,115 | 2,099,696 | 2,306,177 |
| Packard | 0 | 0 | 6,118 | 13,289 |
| Studebaker | 1,957 | 1,302 | 43,894 | 54,154 |
| Total—Studebaker-Packard Corp. | 1,957 | 1,302 | 50,012 | 67,443 |
| Checker Cab | 61 | 52 | 2,881 | 2,625 |
| Total—Passenger Cars | 86,036 | 90,426 | 4,572,208 | 4,158,473 |
| **TRUCK PRODUCTION** | | | | |
| Chevrolet | 4,447 | 5,602 | 256,229 | 264,107 |
| G. M. C. | 1,074 | 1,156 | 48,515 | 68,113 |
| Diamond T | 138 | 85 | 3,896 | 3,673 |
| Divco | 60 | 48 | 2,211 | 2,737 |
| Dodge and Fargo | 233 | 1,464 | 57,312 | 63,180 |
| Ford | 6,282 | 5,466 | 252,953 | 218,091 |
| International | 2,485 | 2,024 | 87,054 | 98,162 |
| Mack | 354 | 279 | 12,471 | 13,143 |
| Reo | 135 | 107 | 3,348 | 2,764 |
| Studebaker | 140 | 15 | 7,321 | 11,402 |
| White | 264 | 215 | 10,613 | 12,914 |
| Willys | 1,047 | 843 | 43,946 | 42,346 |
| Other Trucks | 95 | 85 | 3,920 | 6,131 |
| Total—Trucks | 16,754 | 17,388 | 789,788 | 806,763 |
| Buses | 50 | 45 | 3,002 | 3,215 |
| Total—Motor Vehicles | 102,840 | 107,859 | 5,364,998 | 4,968,451 |

* Included with Chrysler.

## RETAIL CAR SALES BY PRICE GROUPS*

### NUMBER OF CARS

| Price Group | July 1957 Units† | July 1957 % of Total | July 1956 Units† | July 1956 % of Total |
|---|---|---|---|---|
| Under $2,000 | 1,333 | .25 | 85,345 | 16.20 |
| $2,001 to $2,500 | 347,997 | 66.42 | 299,942 | 56.91 |
| $2,501 to $3,500 | 139,450 | 26.62 | 121,764 | 23.11 |
| Over $3,500 | 35,154 | 6.71 | 19,905 | 3.78 |
| Total | 523,934 | 100.00 | 526,956 | 100.00 |

| Price Group | Seven Months 1957 Units† | Seven Months 1957 % of Total | Seven Months 1956 Units† | Seven Months 1956 % of Total |
|---|---|---|---|---|
| Under $2,000 | 19,851 | .56 | 661,927 | 18.52 |
| $2,001 to $2,500 | 2,205,544 | 62.74 | 1,966,792 | 55.03 |
| $2,501 to $3,500 | 1,000,588 | 28.46 | 800,209 | 22.39 |
| Over $3,500 | 289,752 | 8.24 | 145,070 | 4.06 |
| Total | 3,515,735 | 100.00 | 3,573,998 | 100.00 |

### DOLLAR VOLUME OF SALES

| Price Group | July 1957 Dollars | July 1957 % of Total | July 1956 Dollars | July 1956 % of Total |
|---|---|---|---|---|
| Under $2,000 | $ 2,035,491 | .15 | $ 167,263,770 | 13.64 |
| $2,001 to $2,500 | 783,066,839 | 57.02 | 640,961,714 | 52.28 |
| $2,501 to $3,500 | 395,175,169 | 28.77 | 331,959,668 | 27.07 |
| Over $3,500 | 193,151,487 | 14.06 | 85,895,117 | 7.01 |
| Total | $1,373,428,986 | 100.00 | $1,226,080,269 | 100.00 |

| Price Group | Seven Months 1957 Dollars | Seven Months 1957 % of Total | Seven Months 1956 Dollars | Seven Months 1956 % of Total |
|---|---|---|---|---|
| Under $2,000 | $ 36,305,821 | .39 | $1,295,485,700 | 15.50 |
| $2,001 to $2,500 | 4,955,139,312 | 53.83 | 4,229,490,862 | 50.62 |
| $2,501 to $3,500 | 2,824,644,485 | 30.69 | 2,209,755,921 | 26.44 |
| Over $3,500 | 1,388,770,444 | 15.09 | 621,688,072 | 7.44 |
| Total | $9,204,860,062 | 100.00 | $8,356,420,555 | 100.00 |

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four-door sedan or equivalent model. Does not include transportation charges or extra equipment.

†—New registrations of American made cars only. Does not include imported foreign cars.

## NEW REGISTRATIONS OF FOREIGN CARS

*First Seven Months*

| 1957 | | 1956 | |
|---|---|---|---|
| Volkswagen | 36,331 | Volkswagen | 29,641 |
| Renault | 10,309 | Metropolitan | 3,557 |
| M G | 7,959 | M G | 2,497 |
| British Ford | 7,449 | Jaguar | 2,083 |
| Metropolitan | 6,473 | Austin Healey | 1,879 |
| All Others | 35,138 | All Others | 12,357 |
| Total | 103,659 | Total | 52,014 |

## 1957 NEW REGISTRATIONS

Based on data from R. L. Polk & Co.

### NEW PASSENGER CARS

| Make | July 1957 | June 1957 | July 1956 | SEVEN MONTHS 1957 | SEVEN MONTHS 1956 |
|---|---|---|---|---|---|
| Ford | 137,529 | 131,841 | 125,952 | 901,199 | 791,685 |
| Chevrolet | 135,452 | 127,782 | 141,737 | 857,848 | 946,837 |
| Plymouth | 59,623 | 56,335 | 44,221 | 375,393 | 301,539 |
| Buick | 31,624 | 32,230 | 44,928 | 249,638 | 339,122 |
| Oldsmobile | 28,932 | 28,856 | 38,294 | 228,227 | 276,495 |
| Pontiac | 27,380 | 27,716 | 30,618 | 198,961 | 222,931 |
| Mercury | 24,489 | 22,398 | 25,951 | 168,759 | 168,843 |
| Dodge | 24,991 | 23,183 | 20,176 | 161,124 | 133,763 |
| Chrysler | 11,723 | 11,393 | 11,001 | 87,275 | 73,800 |
| Cadillac | 11,435 | 11,147 | 11,681 | 85,169 | 85,490 |
| De Soto | 8,437 | 8,535 | 8,962 | 65,685 | 62,622 |
| Rambler | 9,863 | 8,897 | 6,389 | 53,803 | 43,219 |
| Studebaker | 6,742 | 5,573 | 8,251 | 37,919 | 50,692 |
| Lincoln | 2,562 | 2,402 | 4,025 | 21,890 | 25,923 |
| Nash | 736 | 799 | 1,921 | 6,846 | 16,580 |
| Metropolitan | 1,333 | 1,084 | 792 | 6,473 | 3,557 |
| Packard | 469 | 480 | 2,814 | 3,787 | 20,595 |
| Hudson | 368 | 395 | 859 | 3,590 | 7,997 |
| Continental | 41 | 74 | 114 | 538 | 1,051 |
| Misc. Domestic | 451 | 473 | 457 | 2,629 | 2,296 |
| Foreign | 19,082 | 15,468 | 7,854 | 97,186 | 49,457 |
| Total—All Makes | 543,264 | 517,043 | 534,997 | 3,614,139 | 3,623,484 |

### NEW TRUCKS

| Make | July 1957 | June 1957 | July 1956 | SEVEN MONTHS 1957 | SEVEN MONTHS 1956 |
|---|---|---|---|---|---|
| Chevrolet | 27,725 | 24,735 | 25,738 | 173,565 | 178,995 |
| Ford | 25,600 | 24,529 | 23,640 | 161,151 | 159,047 |
| International | 9,281 | 7,015 | 9,854 | 54,336 | 64,535 |
| G. M. C. | 5,292 | 4,651 | 7,244 | 37,339 | 50,570 |
| Dodge | 4,015 | 3,849 | 5,091 | 28,246 | 34,522 |
| Willys Truck | 1,258 | 1,201 | 1,111 | 8,877 | 7,684 |
| White | 1,165 | 1,078 | 1,388 | 7,940 | 9,477 |
| Mack | 1,257 | 1,084 | 1,165 | 7,824 | 7,743 |
| Studebaker | 540 | 492 | 755 | 4,329 | 5,776 |
| Willys Jeep | 548 | 540 | 763 | 3,636 | 4,776 |
| Diamond T | 308 | 267 | 402 | 2,027 | 2,432 |
| Divco | 199 | 190 | 267 | 1,682 | 1,984 |
| Reo | 190 | 175 | 244 | 1,386 | 1,789 |
| Kenworth | 122 | 124 | 138 | 634 | 761 |
| Brockway | 57 | 44 | 77 | 408 | 613 |
| Peterbilt | 60 | 33 | 72 | 318 | 383 |
| F. W. D. | 36 | 35 | 34 | 292 | 256 |
| Misc. Domestic | 66 | 77 | 69 | 504 | 640 |
| Foreign | 1,398 | 1,216 | 352 | 7,435 | 2,449 |
| Total—All Makes | 79,117 | 71,335 | 78,404 | 501,929 | 533,411 |

*A giant 250-ton teeming ladle (shown above) fills a train of ingot molds at Great Lakes Steel.*

*Cooling the empty molds with a water spray (below) gives more uniform cooling rate, assures return of molds at proper temperature.*

# How Great Lakes Steel *coats ingot molds* for quality

At Great Lakes Steel, ingot molds get a high-temperature resinous coating by means of America's fastest spinner applicator (see picture above). Rotating at 1,700—2,000 rpm, the applicator applies a more even coating to the molds. In just ten minutes, 28 molds are lined with a highly protective shield for the ingot surface. Repeated before each use, this added step in production helps eliminate defects by repelling splashes of molten metal from the mold walls.

This is only one of the hundreds of methods and operations used by Great Lakes right from the start of steel making to maintain the high and uniform quality of its products. This uniform quality can mean real savings to you.

It's easy to get the full story of Great Lakes quality—and dependability, too. Simply pick up your phone and call our nearest representative.

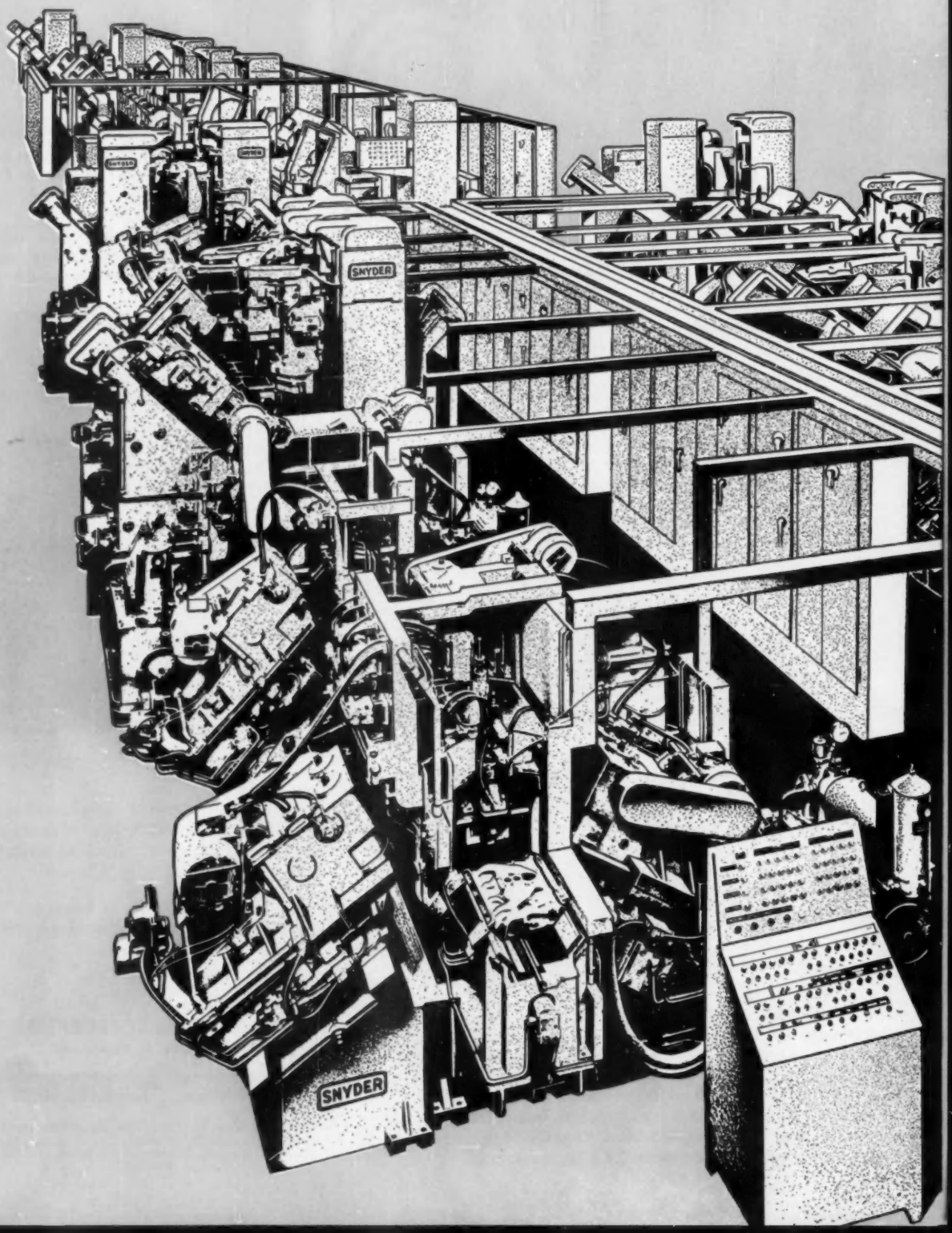
**GREAT LAKES STEEL CORPORATION**

**Detroit 29, Michigan • Division of**

**NATIONAL STEEL CORPORATION**

*District Sales Offices:* Boston, Chicago, Cincinnati, Cleveland, Grand Rapids, Houston Indianapolis, Lansing, Los Angeles, New York City, Philadelphia, Pittsburgh, Rochester, St. Louis, San Francisco, Toledo, Toronto.

# Unique Combination of Snyder Special Two or Four Barrel Intake Manifold

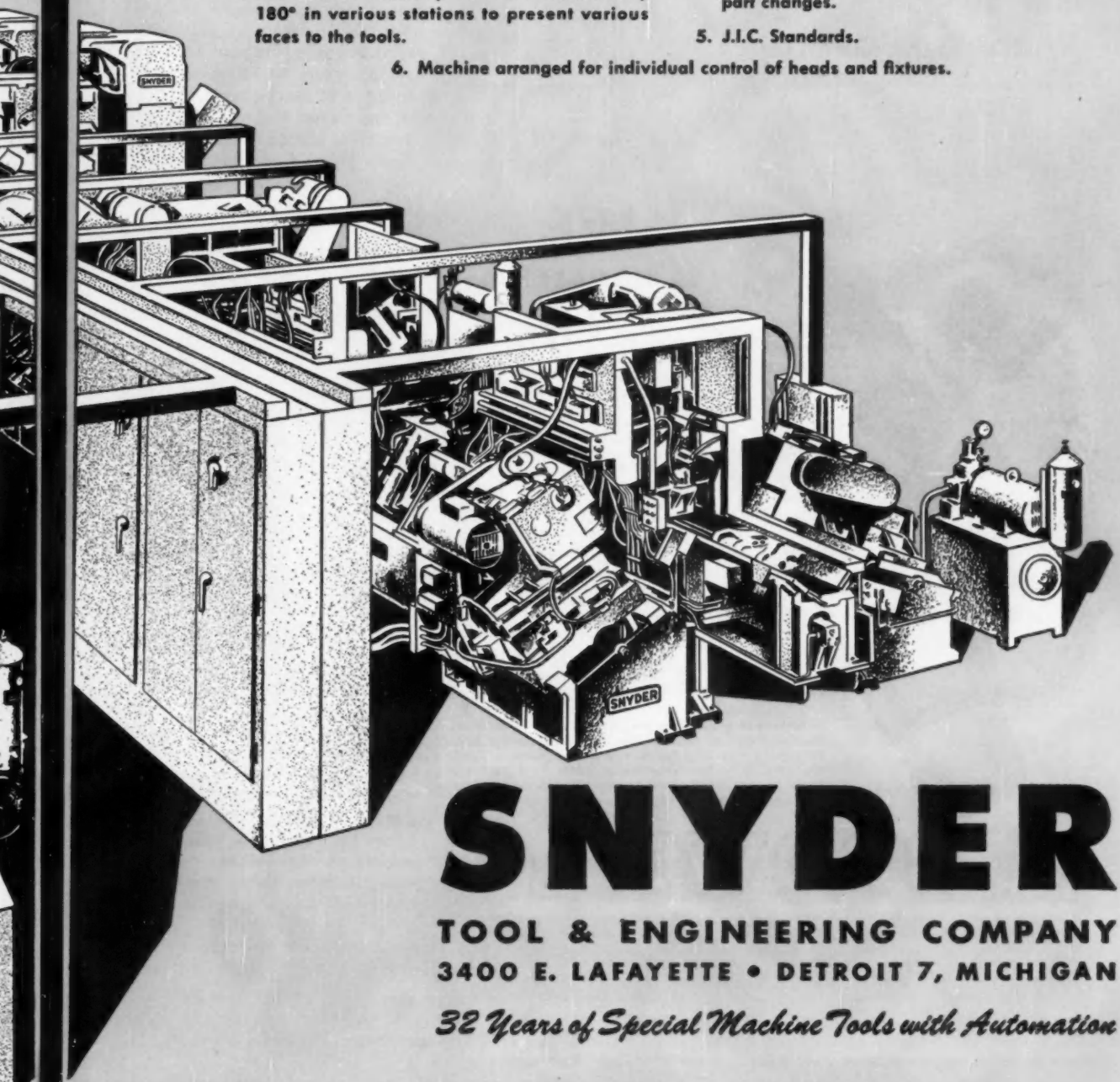


# Transfer Machines Processes Either Castings from Rough to Finished Parts

**Combination of two special transfer milling machines in parallel, with automation, feeding into one special transfer drilling machine gives production of 136 pieces per hour**

**Special Features of Snyder Machines Nos. 55-60 and 55-61**

1. Machine line handles two or four barrel manifolds, random intermixed; sensing devices automatically instruct the proper drilling and tapping units.
2. Part rotated vertically 180° and horizontally 180° in various stations to present various faces to the tools.
3. Individual electrical panels and hydraulic units for each segment.
4. Wing bases, sections, spacers and risers standard throughout for easy adaptation to future part changes.
5. J.I.C. Standards.
6. Machine arranged for individual control of heads and fixtures.




# SNYDER

**TOOL & ENGINEERING COMPANY**

**3400 E. LAFAYETTE • DETROIT 7, MICHIGAN**

*32 Years of Special Machine Tools with Automation*

# METALS

(*Continued from page* 98)

market for their increasing supplies. They are especially directing efforts toward the housing market, to get builders and designers to think aluminum for home construction use. Farmers are being told that aluminum pipe has light weight, easy maintenance, and has an important place in sprinkler irrigation system. Mounting stocks of aluminum (192,856 tons in U. S. on June 30 vs. 17,400 tons a year earlier) have put research men on their mettle to develop new uses for the metal. Planned increases in capacity for the four North American producers, together with three new entrants, will bring total capacity up to 3,775,000 tons a few years hence.

Alcan's Arvida plants are still strike bound in Quebec and about 150,000 tons of production have consequently been lost to date. This has cushioned the slump in demand by removing a substantial amount of metal that would otherwise have been on the market. Nevertheless some fabricators have cut prices well below publicized quotations. Early in September Reynolds Metals reduced charges on large sizes of alloy plate and producers of extruded aluminum products such as window sash have been selling under list prices.


BIG HARDENED & GROUND PARTS?

Look at the work WE HANDLE!

Overall Length
17.187"
17.197"

Maximum Diameter
3.750"
3.752"

Top and center tapers: 1" per foot.

Bottom taper: 2-19/32" per foot.

Here is an intricately formed tapered pin for off-road equipment. It weighs 40 pounds. Starting with heat treated 4" bar stock, three different tapers are turned, with all diameters ground concentric. Ends are hob-threaded, and one end drilled and tapped. Final operation is the cadmium plating of bottom taper.

Mass production of such difficult parts as this is our specialty. Behind it is 40 year's experience in metallurgical engineering, precision grinding and uniform quality control.

For information, send a wire, letter or print. We'd welcome one of your toughest problems.

Henry W. Brown
PRESIDENT

**Experienced production on:** King Pins • Wheel Studs Shackle Bolts • Shackle Pins • Brake Anchor Bolts Countershafts • Idler Shafts • Stub Axle Shafts • Steering Ball Bolts • 5th-Wheel Rocker Shafts • Water Pump Shafts . . . anything in the hardened and ground line, of any analysis steel, up to 4¼" diameter.

THE BROWN CORP.

213 BELLEVUE AVE. SYRACUSE, N.Y.

C. H. Ehlert, 3407 Clarendon Rd., Cleveland . . . Leigh-Patterson, 152 W. Pico Blvd., Los Angeles R. G. Sanderson, 2342 N. Cicero Ave., Chicago . . . Harry J. Windmiller, 1704 Carlton, Fort Worth John B. Hunt, 5611 S.E. Yamhill St., Portland, Ore. . . . N. F. Spring, 4716 Balfour Rd., Detroit B. C. Grant, 108 Fayette Drive, Fayetteville, N. Y.


## Copper Price Reduced For Fifth Time

The fifth reduction in the price of copper since the first of the year, which made copper available from the producers at 27 cents a pound, failed to bring out any large buying orders. Custom smelters had cut to 25 cents early in September, but raised their price to 25½ cents after finding demand had improved. Confidence in the price structure, however, is lacking.

As usual in a period when business news is not overly cheerful, any adverse trade development is magnified out of all proportion to its importance. For example, the statement that the British Board of Trade would sell 27,000 tons of copper in October was featured to have major bearish significance. It was quite overlooked that this selling would be done gradually and would probably not add over one per cent to total copper sales each month.

Nevertheless, there must be further production cutbacks if more price cuts are to be avoided. This is obvious from the latest statistics for the industry which showed refined stocks of copper had mounted to over 191,500 tons, the highest for over two decades. Since the first of the year stocks have increased nearly 71,000 tons in the U. S. alone. While some producers have courageously instituted cutbacks in production, the movement has not been uniform, and increases in output from some new mines have probably nullified the reductions by others. Neither Chile, Belgian Congo, or Canada have made any attempt to curtail output. Brass mills in the Connecticut Valley report better business in August than in July, as the

(*Turn to page* 113, *please*)

# *Speaking of Records*

. . . *our* records show that when a manufacturer once discovers the exceptional and uniform quality of Roebling flat spring steel, he becomes a permanent Roebling customer.

*Your* records for faster production and lower costs can be improved, in large measure, by Roebling's strict attention to supplying you with the finest flat spring steel available. When you need flat spring steel, specify Roebling. Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

**ROEBLING**

*Branch Offices in Principal Cities • Subsidiary of The Colorado Fuel and Iron Corporation*

*Roebling... Your Product is Better for it*



These are typical of the many types of quality parts produced from Roebling flat spring steel.

## LIMBERING UP LUMBER-HANDLING WITH

# CYPAK

*by putting memory into the carriage conveyor system at Lutcher & Moore's Orange, Texas Mill*

CYPAK* static controls—outliving conventional relays 15 times over—are now being used at Lutcher & Moore's Orange, Texas Mill to control resaw conveyors on the lumber industry's first aluminum log carriage.

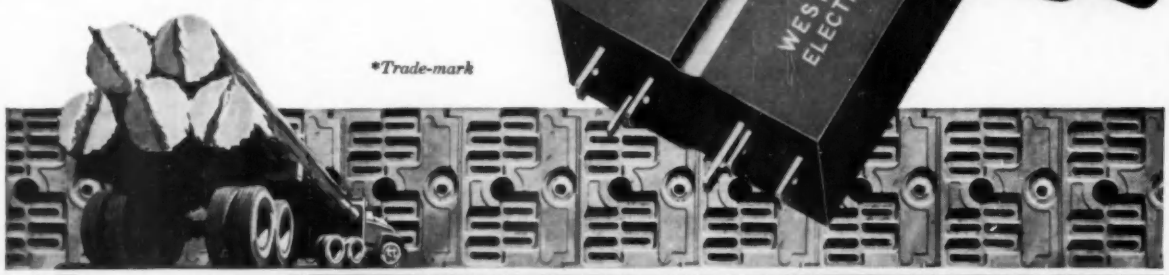
By putting memory into the carriage conveyor system, CYPAK automatically and unerringly separates waste from good boards, diverts slabs to the chipper, automatically sorts and grades, and returns boards requiring another cut back to the saw. Result: a faster, more efficient operation . . . substantial savings in materials handling . . . greater utilization of raw materials.

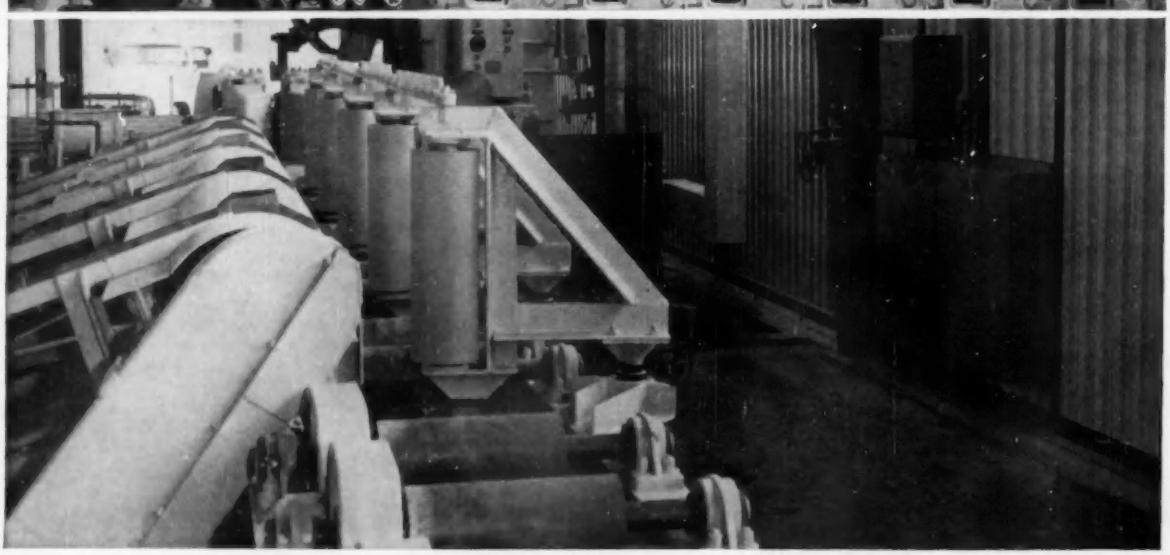
For complete information about the ways CYPAK can benefit you, call your Westinghouse sales engineer. Or, write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-22063

YOU CAN BE **SURE**...IF IT'S

**Westinghouse**

*Trade-mark





Miller®

# 4 New Hydraulic Cylinder Features Benefit You 9 Ways ...At No Added Cost

*MORE MILLER "FIRSTS"*

**NEW! ALL TEFLON* SEALED AGAINST EXTERNAL LEAKAGE...**

1. Eliminates Seal Damage from Fluids—Teflon is impervious to all Hydraulic Fluids (Including Fire-Resistant Types) . . . Hydraulic Cylinders with Teflon Piston Cups Slightly Higher.
2. Eliminates Seal Damage from High Temperatures—Teflon Sealed Cylinders Operate At —100° F. to 500° F.

**NEW! ROD BUSHING SEAL . . .**

1. Eliminates Shearing of "O" Ring in Re-Assembly
2. Eliminates Extrusion of "O" Ring at Extreme Pressures.

**NEW! SHEF SEAL AT TUBING ENDS . . .**

1. Eliminates Shearing of "O" Ring in Re-Assembly
2. Eliminates Extrusion of "O" Ring at *ANY* Pressure—Teflon Sealing Ring is Backed Up by Zero Clearance Metal Shoulder.

**NEW! LOCK-SEAL CUSHION ADJUSTMENT SCREW . . .**

1. Eliminates Screw Projection Beyond Head and Cap — Cylinders Mount on Any Side.
2. Eliminates Manual Sealing and Locking After Flow Adjustment—Teflon Seal is Self Regulating and Self Locking.
3. Eliminates Accessibility Problems—Cushion Screw Interchangeable with Ball Check Position—Adjustable Through Small Wrench Hole Drilled in Interfering Machinery.

*du Pont trademark for its tetrafluoroethylene resin.

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Turn Page For Cross Section Of SHEF SEAL

S SHEAR PROOF
H HEAT PROOF
E EXTRUSION PROOF
F FLUID PROOF
SEAL
Teflon Pressure Energized
Hydraulic Cylinder Tubing End Seal
PAT. APPLIED FOR

**OTHER MILLER QUALITY FEATURES**

- Case-Hardened Chrome Plated Piston Rod
- Rust Resistant Surfaces
- Teflon Oil and Dirt Wipers
- Interchangeable Square Design

Miller - FLUID POWER DIVISION
FLICK-REEDY CORPORATION

2028 N. Hawthorne Ave., Melrose Park, Ill.

AIR AND HYDRAULIC CYLINDERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS • BOOSTERS

Miller®

# Announces a New Space and Price Saving Hydraulic Cylinder Line

## SAVE UP TO 76% OF COST

| Heavy Duty Model LH—Same Size As Ordinary Gasket Type Square Design Low Pressure Cylinders | | | |
|---|---|---|---|
| BORE | NORMAL RATINGS | NON-SHOCK INTERMITTENT RATINGS | YOU SAVE THIS % IN PRICE OVER STANDARD 2000-3000 PSI CYLINDERS |
| 1½" | 1500 PSI | 2500 PSI | 27% |
| 2 | 1500 | 2500 | 27% |
| 2½ | 1000 | 1500 | 28% |
| 3¼ | 1500 | 2500 | 32% |
| 4 | 1000 | 1500 | 35% |
| 5 | 800 | 1200 | 37% |
| 6 | 800 | 1200 | 43% |
| 8 | 500 | 800 | 50% |
| 10 | 500 | 800 | 71% |
| 12 | 500 | 800 | 76% |
| 14 | 500 | 800 | *Not Available in 2000-3000 PSI* |

*MORE MILLER "FIRSTS"*

Miller®

# Announces 50% More Power Per Cylinder Dollar

***with Extra Heavy Duty***

**3000-5000 PSI MODEL H**

# HYDRAULIC CYLINDERS

**Same Price and Mounting Dimensions as Miller 2000-3000 PSI Hydraulic Cylinders.**

**BOTH LINES MADE POSSIBLE BY SHEF SEAL**

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Miller - FLUID POWER DIVISION
FLICK-REEDY CORPORATION

AIR AND HYDRAULIC CYLINDERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS • BOOSTERS

**OTHER MILLER QUALITY FEATURES**

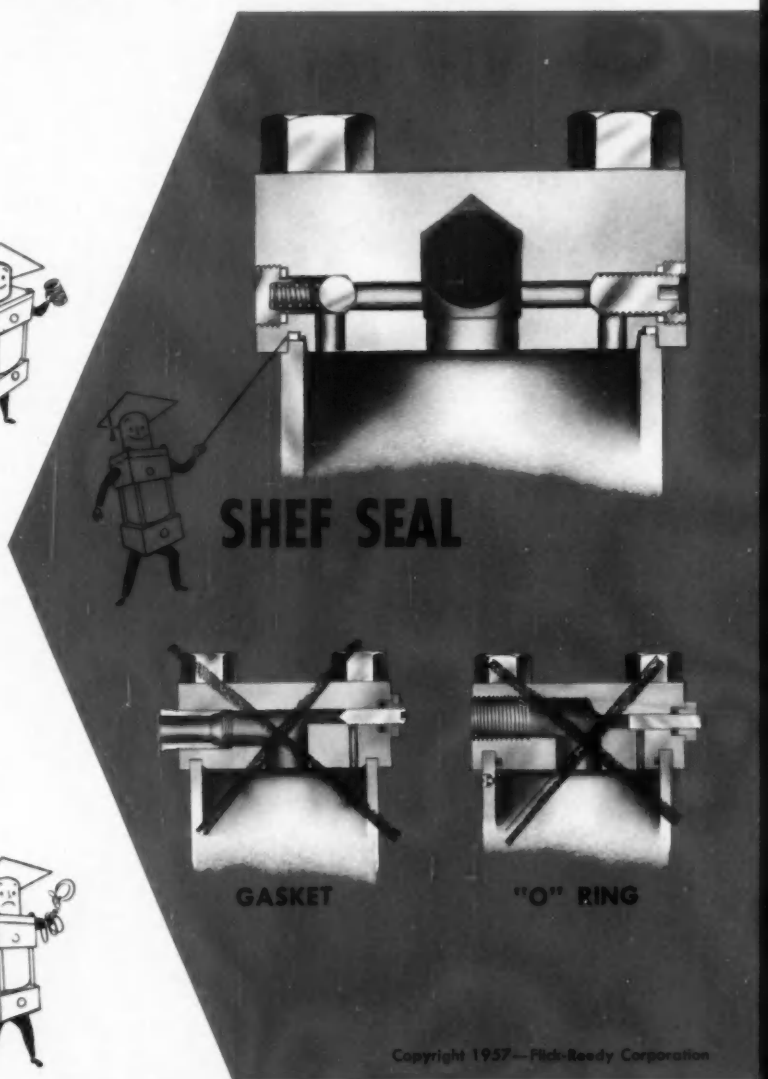
- All Teflon Sealed Against External Leakage—Teflon Cups Extra
- Case-Hardened Chrome Plated Piston Rod
- Shear Proof Rod Bushing Seal
- Ball Check Interchangeable with Self Sealing and Locking Cushion Adjustment
- Rust Resistant Surfaces
- Teflon Oil and Dirt Wipers

S SHEAR PROOF
H HEAT PROOF
E EXTRUSION PROOF
F FLUID PROOF
SEAL
Teflon Pressure Energized
Hydraulic Cylinder Tubing End Seal
PAT. APPLIED FOR

# SHEF SEAL Obsoletes All Other Hydraulic Cylinder End Seals . . . *at no added cost*

## HAS EVERY ADVANTAGE

1. Pressure Energized—Sealing Effectiveness Increased with Pressure.
2. Zero Metal-To-Metal Clearance at all Pressures Gives You Perfect Seal Backup. Sealing Ring Cannot Extrude.
3. Simplified Servicing. No "Blind" Assembly. Sealing Ring Cannot Shear.
4. Teflon* Sealing Ring Withstands All Hydraulic Fluids at Temperatures from —100° F. to 500° F.
5. Head and Cap Axial Movement Does Not Destroy Sealing.
6. Allows Air Bleed In Head and Cap for Remote or Automatic Bleeding.
7. One Sealing Ring Cross Section Dimension For All Cylinder Sizes—Supplied On Convenient Spools.
8. Zero Metal Backup Clearance Eliminates Dangerous Leaks and Spurts of Fluid Due To Seal Failure.



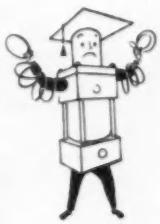

## NONE OF THESE DISADVANTAGES

### GASKET CONSTRUCTION

1. Unpredictable Results—Leaks and Blows Even at Low Pressures.
2. Outlawed by J.I.C. Eight Years Ago.
3. Seal Failure Causes Dangerous Leaks and Spurts of Fluid. Creates Unnecessary Fire and Safety Hazard.

### "O" RING CONSTRUCTION

1. High Pressures and Shock Loads Expand Tubing—Increase Clearance and Cause Extrusion.
2. Blind Assembly Can Shear Sealing Ring—Difficult Servicing.
3. Seal Failure Causes Dangerous Leaks and Spurts of Fluid. Creates Unnecessary Fire and Safety Hazard.
4. Requires Large Inventory of "O" Rings
   —For Servicing Variety of Cylinder Bores.
   —For Special Synthetic Rubber Compounds To Meet Ever Changing Fluid and Temperature Needs.



*du Pont trademark for its tetrafluoroethylene resin.

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**When you buy Miller ... You buy extra years of worry-free Cylinder performance ...at competitive prices**

SHEF SEAL—*Another Miller "First"*

S SHEAR PROOF
H HEAT PROOF
E EXTRUSION PROOF
F FLUID PROOF
SEAL
Teflon Pressure Energized
Hydraulic Cylinder Tubing End Seal
PAT. APPLIED FOR

**OTHER MILLER QUALITY FEATURES**

- All Teflon Sealed Against External Leakage—Teflon Cups Extra
- Case-Hardened Chrome Plated Piston Rod
- Shear Proof Rod Bushing Seal
- Ball Check Interchangeable with Self Sealing and Locking Cushion Adjustment
- Rust Resistant Surfaces
- Teflon Oil and Dirt Wipers

Miller — FLUID POWER DIVISION
FLICK-REEDY CORPORATION

Turn Page For More About MILLER

AIR AND HYDRAULIC CYLINDERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS • BOOSTERS

# All Teflon* Sealed —Perfect Sealing for Hydraulic Cylinders

## HAS EVERY ADVANTAGE...

### Teflon—As Static and Dynamic Seals

1. Impervious to Every Hydraulic Fluid Including Fire-Resistant Types.
2. Seals Perfectly in Cylinders at Temperatures from —100° F. to 500° F.
3. Can Be Molded Into Shapes That Have Zero Leakage—Hold Pressure Indefinitely.
4. With Proper Design of External Seal Cavities, Teflon Can Be Included *Without* Increasing Prices. Miller Provides Teflon for all External Seals at Prices Competitive with Ordinary Cylinders. Leather Internal Piston Cups are Standard (Teflon Cups Extra).

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*du Pont trademark for its tetrafluoroethylene resin.

When you buy Miller
You buy extra years
of worry-free
Cylinder performance
...at competitive prices

## NONE OF THESE DISADVANTAGES

### Synthetic Rubber— As Static and Dynamic Seals

1. Unsatisfactory Except When Used With A Limited Range of Hydraulic Fluids.
2. Even Uncontrollable Changes in Fluid Additives Often Destroy Seal.
3. Specific Compounds Needed for Compatibility with Specific Fluids Normally Used Today.
4. Normal Temperature Range Limited to 0° F. to 130° F. Slightly Reduced Life When Operated at 130° F. to 150° F. Greatly Reduced Life at 150° F. to 250° F.
5. External Leakage Causes Fire and Safety Hazards When Temperature or Fluid Destroys Seals.
6. "U" Type Seals Without Mechanical Retainer at Mid-Section Frequently "Roll" and Lose All Sealing Ability.

### Resin Impregnated Leather— As Dynamic Seals Only

1. Is Compatible with Many—But Not All—Hydraulic Fluids and Additives Including a few Fire-Resistant Types.
2. Normal Temperature Range Limited to —60° F. to 130° F. Slightly Reduced Life When Operated at 130° F. to 150° F. Substantially Reduced Life at 150° F. to 250° F.
3. External Leakage Causes Fire and Safety Hazards When Temperature or Fluid Destroys Seals.

Miller Uses Leather Piston Cup Seals for Internal Sealing... Standard Price (Teflon Cups Extra).

### Piston Rings— As Dynamic Internal Seals

1. Most Piston Rings Allow Some Leakage.
2. Allow "Slip" or "Drift" of Piston Due To Leakage—Unsatisfactory for Many Applications.
3. Allow Varying Feed Rates Due To Leakage Because Of Viscosity Change During Startup—Unsatisfactory for Most Multiple and Automated Operations.
4. Allow Some Pressure Loss.
5. Chips and Dirt Enter Space Between Piston and Tube Causing Scoring —Especially During Startup.

All Teflon Sealed—*Another Miller "First"*

Miller - FLUID POWER DIVISION
PICK-READY CORPORATION
2028 N. Hawthorne Ave., Melrose Park, Ill.

AIR AND HYDRAULIC CYLINDERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS • BOOSTERS

**OTHER MILLER QUALITY FEATURES**

- All Teflon Sealed Against External Leakage—Teflon Cups Extra
- Case-Hardened Chrome Plated Piston Rod
- Shear Proof Rod Bushing Seal
- Ball Check Interchangeable with Self Sealing and Locking Cushion Adjustment
- Rust Resistant Surfaces
- Teflon Oil and Dirt Wipers

# METALS

(*Continued from page* 106)

vacation period ended. More interest is shown by the automobile makers in placing orders. The decline in new housing starts seems ended, with more orders for copper piping and accessories. Wire and cable manufacturers have no complaint over their business.

British consumption of copper in the first half of the year was more satisfactory than in U. S., totalling over 331,000 tons, or more than was used in the same period '56.

The import duty of 2 cents a pound on copper was suspended by Congressional action until June 30, 1958, unless at a time previous to that date the average price of copper for any calendar month dropped below 24 cents a pound. In such a case the 2-cent duty is automatically reimposed. It appears unlikely that buyers would wait until the 24-cent price was broken as they might then be confronted with a 26-cent price, or more on future orders.

An official of Phelps Dodge Corp. has proposed that the import tax on foreign copper be raised to at least 4 cents a pound and the base price at which the duty would take effect be increased to 32 cents a pound from 24 cents. It is pointed out that the present peril point of 24 cents was established in 1951, but in the interim costs have increased about one-third, hence the new base should be 32 cents. It is likely most producers would be satisfied with 30 cents.

### Titanium Production Cut

Washington has stopped buying titanium sponge for production capacity incentive purposes. The current production goal of 22,500 tons per year has been exceeded by the industry which now has an annual capacity of 31,500 tons. As a result sponge production has dropped sharply. Heretofore over 95 per cent of titanium mill products have gone directly or indirectly to the airplane manufacturers on Government order. Consequently, the recent stretch-outs and cancellations have left the titanium makers with much more capacity than needed by orders on their books. Nevertheless, Titanium Metals Corp. has received the largest industrial order for fabricated titanium in the history of the industry and it wasn't remotely related to aviation. It calls for seven miles of seamless titanium pressure tubing for chemical process application, which will go into heat exchangers for processing nickel and cobalt ore at Freeport Sulphur's forthcoming plant at Moa Bay, Cuba.

# News of the MACHINERY INDUSTRIES

(*Continued from page* 79)

interest in M.P.J. Gauge & Tool Co., Ltd., Birmingham, England. The latter company has been producing special high-precision fixed gaging equipment and dial indicator instruments, which it will continue to make and sell.

Immediate expansion of the M.P.J. plant facilities is scheduled, Mr. Polk said, which will eventually enable the British company to manufacture and sell all Sheffield products in the English market. Initially, production will include products of Sheffield's standard production instruments division. Among these are various Precisionaire gaging units adapted for use in the automotive, aircraft and guided missile fields.

### ASTE 1958 Tool Show Sold Out Completely

All exhibit space in ASTE's 1958 Tool Show has been taken, the last assignments having been made nearly eight months before the opening date of May 1, 1958. The show was completely sold out in less than three months after the initial announcement.

A total of 462 exhibitors will have displays in the show, which is to be held May 1 to 8 at Philadelphia's Convention Hall in conjunction with ASTE's 26th annual meeting and convention.


Having Trouble Getting SPECIAL Screws?

Chances are that the "special" you need is "standard" in the wide line carried by Southern—long or short; wide or thin; Phillips or slotted; round, oval, or flat; Brass, Aluminum, Steel, Silicon Bronze, Stainless Steel in any of the popular plated finishes.

When you need specials, ask *Southern* first!

Write us your specifications. Free samples and Stock List if requested on Company letterhead. Box 1360-AI, Statesville, North Carolina

Wood Screws • Machine Screws & Nuts
A, B, C & F Tapping Screws • Wood & Type U Drive Screws • Dowel Screws • Stove Bolts
Roll Thread Carriage Bolts • Hanger Bolts

Southern SCREW COMPANY
STATESVILLE • NORTH CAROLINA

Warehouses: NEW YORK • CHICAGO • DALLAS • LOS ANGELES

PAT. APPLIED FOR

MURRAY WAY "PROVED RIGHT" EQUIPMENT AND ENGINEERING EXPERIENCE ARE THE ANSWER TO YOUR POLISHING, BUFFING AND GRINDING NEEDS.

Whether you need a single, standard polishing head or a specially engineered, fully automatic production line with all the trimmings, Murray-Way can do the job better, more reliably, for greater operating efficiency.

You are invited to consult our engineering staff about your finishing problems.

MURRAY WAY CORPORATION

P. O. BOX 180, MAPLE ROAD EAST BIRMINGHAM, MICH.

*Polishing, Buffing, Grinding, Filtering Equipment that automatically cuts your costs.*

## ON OUR WASHINGTON WIRE

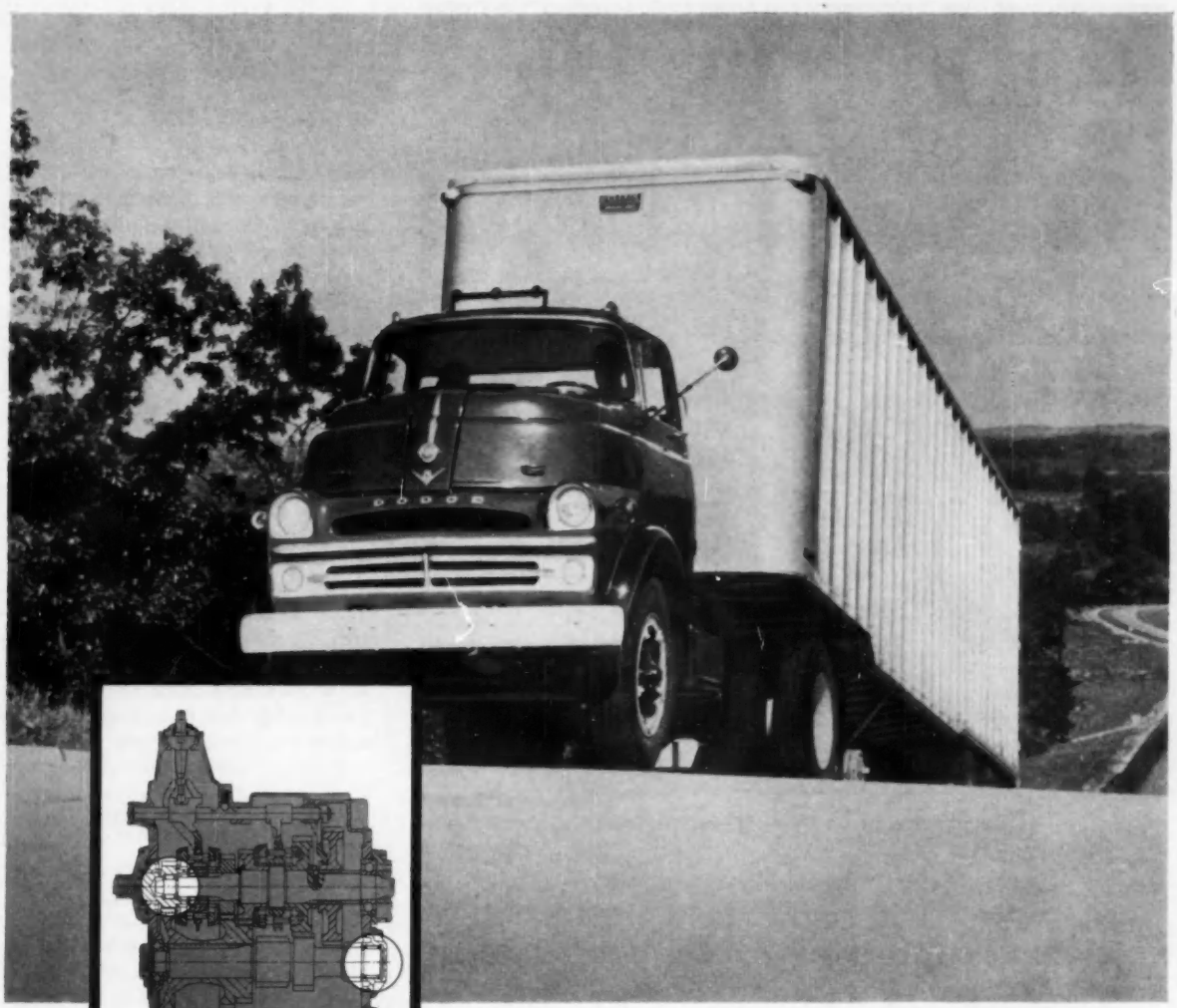
**Army research and development officials hope to pick the design for the new "aerial jeep" this year. Some 19 firms, many of them in the automotive industries, submitted proposed designs for the jeep, which will carry a 1,000-lb payload.**

Military services are having trouble getting new missiles into production before they are obsolete. Most missiles, the experts say, often are improved on the drawing boards before manufacturers can get the first few delivered. Because scientists are redesigning faster than developers are producing, "we are apt to have a lot of mockups but no missiles if we're not careful," one Congressman remarks.

**The Army's new "flying crane", now going into production is capable of lifting from 9 to 12 tons for up to 60 miles. The crane, a sort of helicopter, is designed to carry heavy equipment over rough terrain and obstacles such as rivers, as well as into fighting areas.**

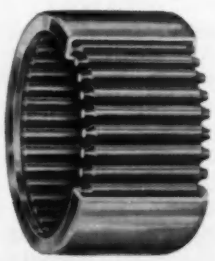
Although military thinking is sharply divided on airlifting of troops and supplies to beat down brushfire wars, likelihood is that 100 per cent of all personnel, specialized weapons, and electronics gear will go by air, if planes are available. Bulk of rations, gasoline, and ammunition will travel by sea.

**Twenty-one hundred miles of toll roads in 15 states have been included in the National System of Interstate and Defense Highways, as a result of recommendations by state highway departments and approval of Bureau of Public Roads.**





This Dodge "Power Giant" truck is equipped with the New Process Gear Corporation Model 540 5-Speed Truck Transmission, containing a Torrington Needle Bearing in the rear countershaft position and a Torrington Needle Roller assembly between the mainshaft pilot and the drive gear.



# Over the long haul...

New Process Gear Corporation truck transmissions are a favorite among America's leading truck manufacturers because of their high ratio of capacity to size. Contributing to their reliable performance and smooth operation are compact, high-capacity Torrington Needle Bearings.

These efficient, anti-friction bearings were chosen for use in these heavy-duty truck transmissions because they provide unequaled radial load capacity with the smallest possible cross section. Smooth, efficient functioning and easy maintenance are assured since the bearings start and operate with a minimum of friction and retain lubricant effectively.

These qualities, which have won Torrington Needle Bearings leadership in the field, have also led to their use in all types of automotive equipment: steering knuckles, brakes, clutches, hydraulic pumps and many others. If your product would benefit from compact, anti-friction Needle Bearings with high capacity and long service life, talk to your Torrington representative who will be glad to give you engineering assistance. Or, if you'd prefer, write: **The Torrington Company, Torrington, Conn. – and South Bend 21, Ind.**

**TORRINGTON BEARINGS**

*District Offices and Distributors in Principal Cities of United States and Canada*

**NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • NEEDLE ROLLERS • BALL • THRUST**

# Why MICROHONING
## Lowers Costs, Increases Production, Improves Quality of Grinding Wheels

Bay State Abrasive Products Company, one of the largest and most progressive manufacturers of abrasive products, Microhones the arbor hole of their snagging wheels to secure improved wheel performance, reduce manual handling, lower processing costs and increase production.

### Why Microhoning Saves Time, Energy and Reduces Processing Costs of Arbor Holes over 50%:

1. **Less Equipment**—one Microhoning machine does work of two grinders.
2. **Less Operating Costs**—Microhoning processes 450 to 600 grinding wheels per set of abrasive sticks; abrasives cost was substantially higher with former grinding method.
3. **Less Maintenance**—Hydrohoner has no chucks to maintain and there is now only one machine instead of two.
4. **Less Gaging**—Microhoning *automatically* brings arbor hole to size within .003" tolerance; former grinding method required repeated gaging during operation.

### Why Microhoning Improves Performance of Grinding Wheels:

1. **Better Fit**—inherent qualities of the Microhoning process are geometric accuracy and ability to hold close tolerances . . . rounder and accurately sized arbor holes assure a better fit.
2. **Less Arbor Wear**—Microhoning cuts both abrasive grain and resinoid bond while producing a smoother hole.
3. **Less Chatter**—Microhoning assures arbor holes that are square with faces and more concentric with O.D.

**See page to right for "How Microhoning" accomplishes the above results.**

*The principles and application of Microhoning are explained in a 30-minute, 16mm, sound movie, "Progress in Precision" . . . available at your request.*

☐ Please send me "Progress in Precision" in time for showing on _____(date).
☐ Please have a Micromatic Field Engineer call.
☐ Please send Microhoning literature and case histories.

NAME _____ H
TITLE _____
COMPANY _____
STREET _____
CITY _____ ZONE _____ STATE _____

**MICROMATIC HONE CORP.**
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN


# Evaporative Cooling System

(*Continued from page* 61)

check valve in the latter functions during inverted flight or negative gravity conditions to prevent the loss of water; the same valve controls the boiling pressure. A baffle prevents loss of water during violent boiling.

### Test Program

Martin has been testing the system for over a year and plans to continue development work on it. Demonstrations that are said to have evoked considerable interest have been given to representatives of the Armed Forces. Martin states that basic techniques can be used for manufacture of the system if it is put into production.

Tests with initial models showed that electronics equipment would provide sufficient heat to boil water and that the technique is practical for components mounted in the base of the chassis. Additional work would be required for very high temperatures.

Results with both a single tube amplifier circuit test unit and a multiple unit indicated basically constant temperatures for the components, despite aerodynamic heating conditions equivalent to those encountered at Mach 2 to 4.5. While outside temperatures were raised from 150 C to 400 C, components protected by the system were said to have climbed less than 10 C on the average.

### Packaging

A packaging survey of some 50 different pieces of electronics equipment for various applications was made. It was reported that the Martin evaporative technique would result in a 10 per cent weight increase in the packaging of the unit, not including the weight of water; volume increase would be minor.

Since the component parts can be operated at essentially a fixed temperature level, compensation in the electronic circuitry can be simplified. By the same token, individual component parts can be arranged for the best functional layout. Fur-

thermore, Martin states, any of the familiar electronics techniques can be used in the detail design. Conventional wiring, printed wiring, modular stacked wafer design, or CNI modular type packaging lend themselves readily to the concept.

From the viewpoint of installation, the modular concept arrangement permits contouring and unit packaging to use space in the most effective fashion. As the cooling system is self-contained, the equipment can be remotely located. More specifically, the "black box" can be put out on the wing tip next to the antenna instead of in the fuselage near the cooling system. Weight saving also becomes an important factor at higher speeds.

Volume saving in manned aircraft is reported to be about 64 cu ft, while that for missiles is approximately 1½ to 3 cu ft. Major reduction in volume is found in the elimination of storage tanks and the pressure feed source required to force evaporant through a liquid cold plate evaporative system.

## OBSERVATIONS

(*Continued from page* 100)

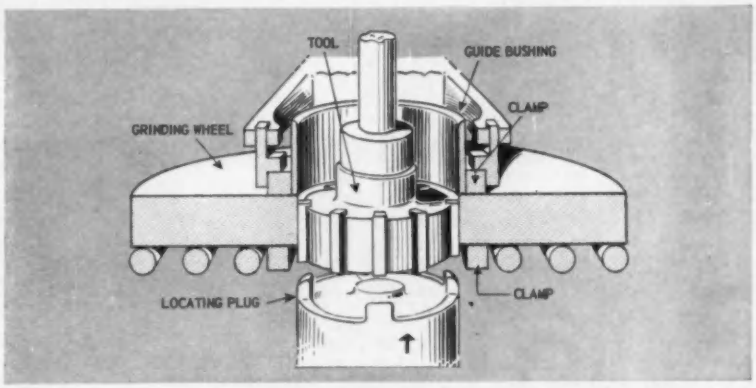
fine; that any unique EP test may not measure all the beneficial properties; that an EP lube can't compensate for poor design. There is more. And we suggest that you get a copy for your own reading.

### Engine Output

With few exceptions we expect to see larger displacement engines for 1958. One of the chief reasons for this is not higher advertised horsepower but the desire to have more usable power available. The drain on engines is increasing with each model. In addition to the increased electrical load due to dual headlamps, electric push-buttons, and electrical assists, we have more pumps to drive. Many cars will have a large compressor for air conditioning, a hydraulic pump for power steering, and an additional compressor for the air suspension. No one but the car owner and the safety expert will be surprised at the amount of power left to drive the wheels.


# How MICROHONING Lowers Costs, Increases Production, Improves Quality of Grinding Wheels

By changing from grinding to Microhoning of arbor holes, Bay State Abrasive Products Company has realized substantially lower processing costs, raised productivity and improved the performance qualities of their snagging wheels.




## Here's How Microhoning Now Saves Time, Labor, Material and Processing Costs:

1. Snagging wheels now travel from facing machine to Hydrohoner on a conveyor—there is no manual lifting or handling.
2. A disappearing plug automatically locates wheels in Hydrohoner where they are clamped on the faces and remain stationary during Microhoning operation—there is no manual placing of wheels on chucks, or chucks to maintain.
3. One Hydrohoner does work of two grinders; and one set of Bay State iron bonded, diamond sticks Microhones from 450 to 600 resinoid-bonded wheels—less equipment to maintain and lower costs for abrasive.
4. In approximately a minute, Microhoning removes from .030" to .070" of stock from arbor holes ranging in diameter from 6" to 12"—processing is faster and material is saved because wheels can now be molded closer to final size.
5. Microhoning tool automatically holds diametric accuracy within .003" tolerance—repeated manual gaging is eliminated.

**See page to left for "Why Microhoning" provides cost-and-time-saving benefits.**

*Send Coupon for Complete Information*

Learn how Microhoning will give efficient stock removal, closer tolerances, accurate alignment and functional surfaces.

☐ Please have a Micromatic Field Engineer call.
☐ Please send Micromatic literature and case histories.

NAME_____ H

TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

**MICROMATIC HONE CORP.**
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

# AUTOMATION News Report

(*Continued from page* 96)

fasten resistors, capacitors diodes, and the like—automatically—onto printed circuit panels before they are inserted into computers and other electronic equipment. In addition, when a change in the layout and componentry of a panel is called for, the machine gets instructions from IBM cards and then automatically resets itself for the new assignment.

The new device, called the Programmed Component Assembly System, was developed and built by manufacturing engineers at IBM's Poughkeepsie plant. IBM engineers say assembly speed is better than 10 times faster than is possible by manual methods and a more uniform product is obtained.

Components to be assembled are grouped according to their electrical values, mounted on masking tape "belts," and wound on "cut-off" reels. Several thousand components are stored on each reel in this fashion. The system has a capacity of 20 reels, although it can be expanded to accommodate many times that number if necessary. The reels are set in place on the selection "rack" and the lead-taped components are fed into cut-off stations.

In order to attach a component on a printed panel, three instructions must be provided simultaneously by the system's card reader. Two columns of an IBM card contain the three instructions needed to insert any one component. The first tells the device which one of 20 different stored components to select, cut-off from its reel, and deliver to the insertion system. The second and third instructions position the panel so that the selected holes are accurately aligned under the insertion mechanism. When all three instructions have been obeyed, the insertion system automatically inserts the selected component and staples it to the panel. This process continues repeatedly until all instructions have been followed and the printed panel is completely assembled.

The Programmed Component Assembly System will accommodate any size panel up to 10 inches square and will operate to accuracies of better than 0.002 in. A two-directional servo system, which performs the positioning operation, can locate the panel to receive a component at any intersection of a 0.050 in. grid.

IBM is using the new device to assemble wiring panels for the company's data processing equipment, but it is also considering a plan to make the machine available to industry.

## NUMERICAL CONTROL REPORT

The Aircraft Industries Association, after two years of intensive study, has issued a comprehensive report dealing with the problems of numerical control. Coming as it does just as the first deliveries of numerically controlled machine tools are being made under the USAF's big machine tool program,

(*Turn to page* 122, *please*)

SEIBERT
ADAPTERS
View of 350 ft. Cross-built V-8 cylinder block machine equipped with Seibert Adapters. Performs a total of 555 operations.
"Meet Our Standards Completely"

CHECK THESE SEIBERT FEATURES

- Designed with convenient starting ring for easy installation.
- Relieved key seat eliminates swell, assures easier setups.
- Manufactured to GMC, Ford, Chrysler & ASA standards.
- Let produced, economically priced.

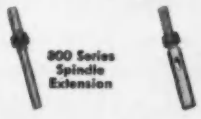
**Says THE CROSS COMPANY • Detroit**

● High production machine tools, like The Cross Company builds for the automotive industry, are a marvel in machining efficiency. All heads and tools must function smoothly and accurately within precision limits. Seibert "Shur-Lock" Adjustable Adapters, play an important part in maintaining the precision and efficiency required. For example, they are built to hold total concentricity within .002 (total indicator reading) 6" from end of the adapter—one reason why The Cross Company says, "Your production tools meet our standards completely." You can depend upon Seibert service, too. There is a Seibert man near you—ask for his phone number today.

New Tool Control Board—individually designed to suit your needs.

WRITE FOR ADAPTER BULLETIN, LATEST PRICE LIST

Ask for Folio 2-50. Gives complete specifications. Lists range of sizes available from stock. Ask also for brochure illustrating new control boards and complete line of holding tools.



800 Series Spindle Extension

900 Series Spindle Extension

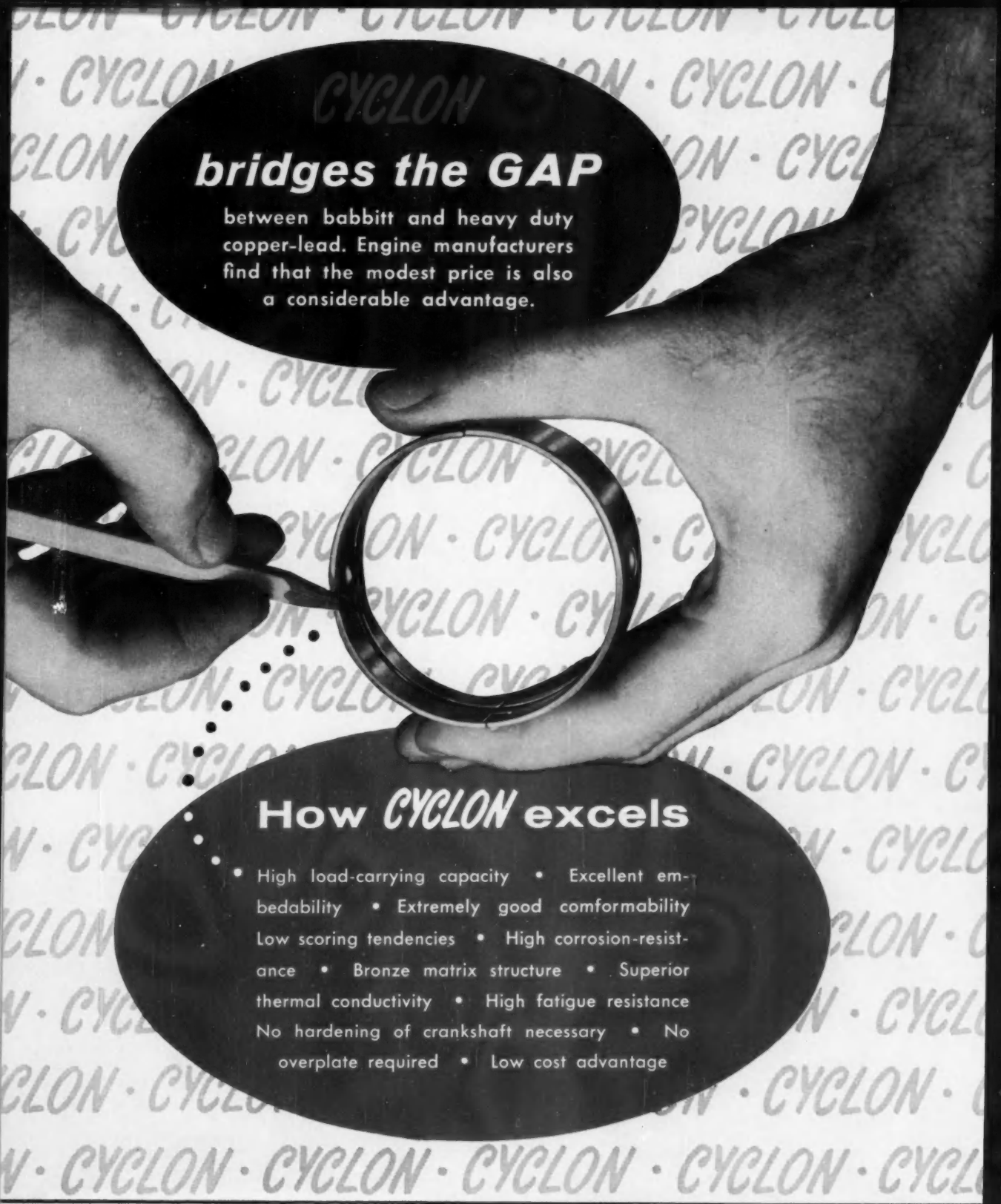
Compression or Tension Tap Driver

Floating Holder

**SEIBERT & SONS, INC.** 1008 E. 24th STREET CHENOA, ILLINOIS

*Quality* MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

SEIBERT

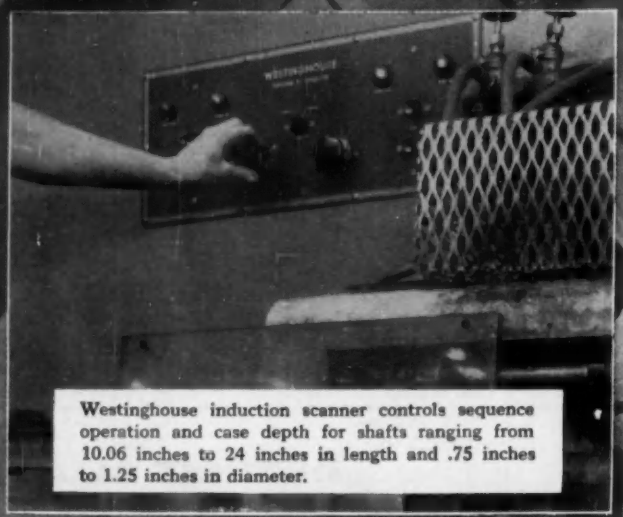

bridges the GAP
between babbitt and heavy duty copper-lead. Engine manufacturers find that the modest price is also a considerable advantage.
How CYCLON excels
• High load-carrying capacity • Excellent embedability • Extremely good comformability Low scoring tendencies • High corrosion-resistance • Bronze matrix structure • Superior thermal conductivity • High fatigue resistance No hardening of crankshaft necessary • No overplate required • Low cost advantage

**DETROIT ALUMINUM & BRASS CORPORATION**

DETROIT 11, MICHIGAN

MANUFACTURERS OF ORIGINAL EQUIPMENT SINCE 1925

# WHAT'S HAPPENING AT



Westinghouse induction scanner controls sequence operation and case depth for shafts ranging from 10.06 inches to 24 inches in length and .75 inches to 1.25 inches in diameter.

PRODUCT AND **PROFIT** IMPROVEMENT

# BURGESS-NORTON?

## 500,000 rocker arm shafts hardened—and no rejects ...with Westinghouse Induction Heating!

At Burgess-Norton Mfg. Co., Geneva, Illinois, Westinghouse Induction Heating is producing five important advantages in hardening automotive engine rocker arm shafts.

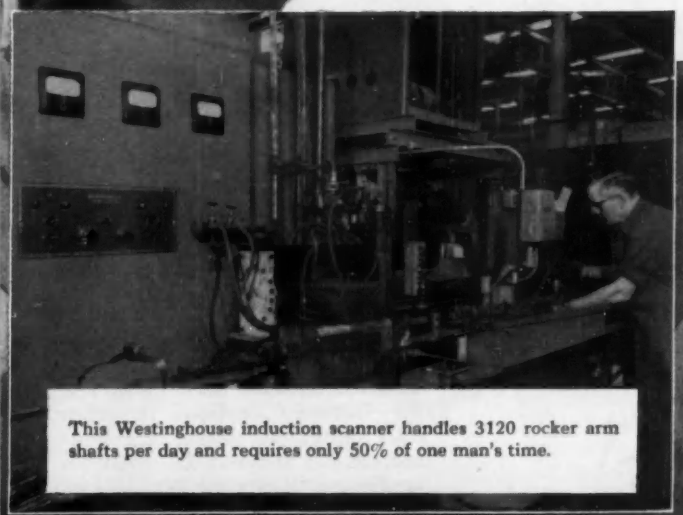
1. No cracking.
2. No distortion.
3. Shafts harden evenly to uniform case depth.
4. Overall savings in manpower.
5. Partial stress relief because of stored heat within the shaft.

The entire operation is automatic. Shafts are conveyed to the induction unit, jigged, spun at 400 rpm while heating to 1550°F., then quenched in a water spray . . . all in just 3.25 seconds for each of six sections on a shaft.

This is exciting, important news for many plants concerned with hardening, heat treating, joining, forging or other metalworking operations. Westinghouse Induction Heating, *within seconds*, puts heat *exactly* where you want it day after day, week after week, without variation. This precision and uniformity is vital with today's high speeds and close tolerances.

Westinghouse Induction Heating units are clean, cool, streamlined and space saving. Westinghouse engineering creates for your individual requirements integrated production line equipment that speeds output, cuts costs, brightens your profit picture.

**YOU CAN BE SURE...IF IT'S Westinghouse**



This Westinghouse induction scanner handles 3120 rocker arm shafts per day and requires only 50% of one man's time.

**WITH WESTINGHOUSE INDUCTION HEATING**

## BUT MAYBE INDUCTION HEATING IS NOT FOR YOU...LET'S FIND OUT

Telephone collect EDmonson 6-2300, or return this coupon to SALES MANAGER, Industrial Electronics Dept., Westinghouse Electric Corporation, P. O. Box 416, Baltimore 3, Maryland.

I believe that we qualify for Westinghouse Induction Heating. _____Please have your engineer call. _____Please send literature. We make_____(item) from_____ (metal or alloy). Each piece is approx._____(size) and weighs approx._____. We work in temperature range of_____and handle approx._____ per hour. We are interested in: _____Forging_____Hardening _____Joining_____Other.

Please describe briefly_____

Please check below the Westinghouse Induction Heating advantages you believe are superior to your present process.

_____Selective heat _____Safety
_____Instantaneous heat _____Consistent results
_____Minimum scale _____Production-line heating

Name_____Title_____

Company_____

Street & No._____

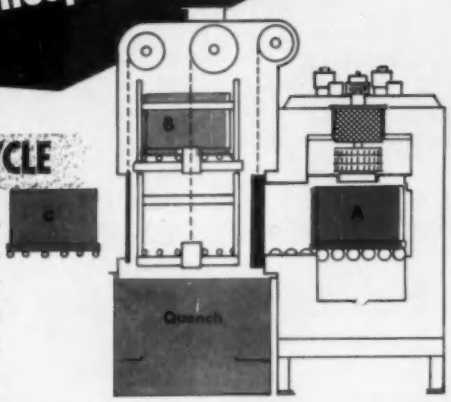
City & State_____

J-35000

# Sealed Cycle.....
## A Dow Furnace FIRST for Batch-type controlled atmosphere furnaces.

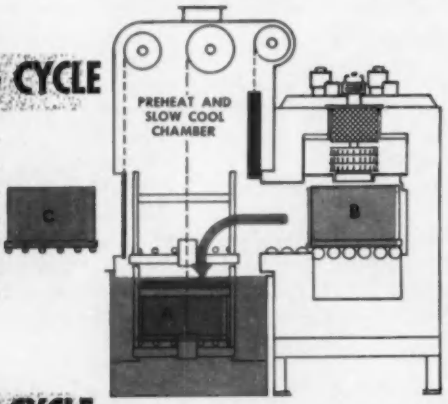
### Step 1–LOADING CYCLE

Box A containing full furnace load of parts processing in work chamber. Box B—fully loaded, pre-heats in the upper vestibule. Box C—fully-loaded, waits on conveyor.




### Step 2–QUENCHING CYCLE

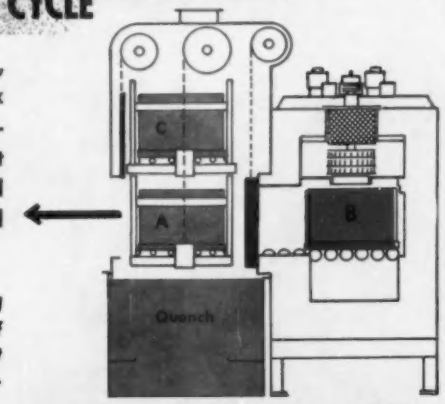
Box A completely processed, moves out to elevator and is lowered into quench; bringing preheated Box B to loading level. Box B is pushed into heat chamber and door is closed.




### Step 3–RELOADING CYCLE

After proper interval, outer door is opened. Box C is placed on upper elevator and raised to pre-heat position as Box A is lifted from quench and removed from lower elevator.

*Sealed Cycles, double door seal affords complete flexibility of processing without exposing heat chamber to air contamination.*




Upper vestibule is easily adapted for slow cooling. Quench is adaptible for interrupted quenching.

**DOW FURNACE COMPANY**

12045 Woodbine Ave., Detroit 39, Mich.
Phone: KEnwood 2-9100

*First* WITH MECHANIZED, BATCH-TYPE, CONTROLLED ATMOSPHERE FURNACES


# AUTOMATION News Report

(*Continued from page* 118)

this timely 114-page booklet should be a valuable guide to airframe manufacturers in their use of the new tools.

Prepared by the AIA's subcommittee for Numerical Control of the Airframe Manufacturing Equipment Committee, the report outlines the characteristics of various types of numerical control or programming now available or under development and proposes National Aircraft Standards for numerical control equipment.

The committee has limited its investigation primarily to AIA Class IV machines (continuous tool path control) which are used on profilers, skin mills and spar mills, because it is on this type of equipment that the committee felt that the greatest production increases and cost reduction can be made by the aircraft industry.

Other matters covered in the report are the problems of data processing and of training data processing personnel, the economics of interpolator location, testing of numerical control machines, and the capabilities of the three types of data storage.

• • •

## Progress in Small Business

Government contracts set aside for exclusive award to small business for the fiscal year 1957 showed an increase of nearly 50 per cent over fiscal 1956. Total Government contracts set aside for small business at the close of June 30, 1957, amounted to $744,335,298 for the year. This was an increase of $246,656,866 over the fiscal 1956 figure of $497,678,432.

•

**The Small Business Administration will continue in operation for at least another year. Although the Congress declined to grant SBA permanent status, the lawmakers did increase the agency's lending authority by $75 million, bringing the total authority to $530 million.**

DU PONT

Better Things for Better Living . . . through Chemistry

# AUTOMOTIVE ENGINEERING NEWS

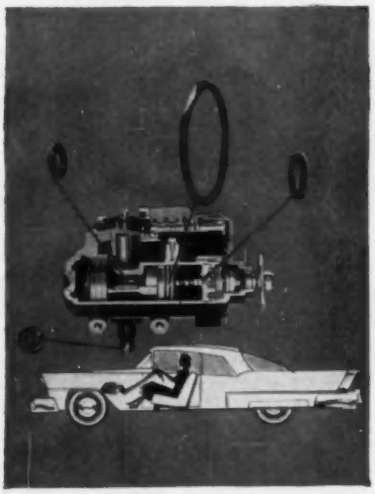
LATEST PROPERTY AND APPLICATION DATA ON

TEFLON® tetrafluoroethylene resins

## Less break-away effort, smoother steering, with parts made of TEFLON 1

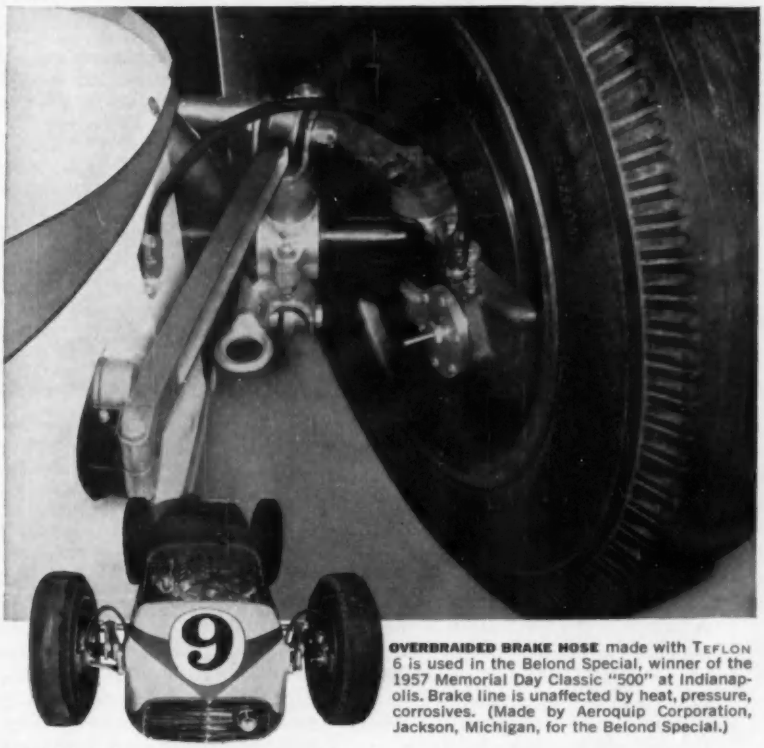
The power-steering unit shown below makes parking almost twice as easy — allows more relaxed driving. Featured in this automotive advance are the seals, piston ring, and lock-nut seal ring made of TEFLON 1, which have substantially reduced break-away effort. Even under high pressure they allow the shaft to turn freely, thus solving a binding problem caused by other materials.

TEFLON tetrafluoroethylene resins have the lowest coefficient of friction of any solid, with a measured kinetic and static coefficient of 0.04. They are suitable for use from −450°F. to +500°F., remain relatively flexible, and maintain good impact strength over this range.



## Hose lines of TEFLON® end failures caused by chemical action... high temperatures

tetrafluoroethylene resins




**OVERBRAIDED BRAKE HOSE** made with TEFLON 6 is used in the Belond Special, winner of the 1957 Memorial Day Classic "500" at Indianapolis. Brake line is unaffected by heat, pressure, corrosives. (Made by Aeroquip Corporation, Jackson, Michigan, for the Belond Special.)

Reliability of performance and the ability to stand up under terrific punishment were the reasons for choosing overbraided brake lines made with TEFLON 6. The designer of the winning car in the Indianapolis racing classic selected these lines because they withstand all varieties of automotive chemicals and operate reliably even at a temperature of 500°F. Because of its very low volumetric expansion, the TEFLON resin used in the lines gives a firm pedal to the brake system that previously had been impossible to achieve. Hose lines of TEFLON 6 easily withstand the vibration and flexing of a grueling track run.

Du Pont TEFLON tetrafluoroethylene resins may help make your product a winner. Send the coupon for interesting technical facts and more end-use ideas.

**Watch the Du Pont "Show of the Month." 90 minutes of the very best in live television — CBS-TV network.**

### TEFLON®

***is a registered trademark...***

**TEFLON** is Du Pont's registered trademark for its fluorocarbon resins, including the tetrafluoroethylene resins discussed herein. This registered trademark should not be used as an adjective to describe any product, nor should it be used in whole, or in part, as a trademark for a product of another concern.

### SEND FOR INFORMATION

For additional property and application data on Du Pont TEFLON tetrafluoroethylene resins, mail this coupon.

E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Dept.
Room 410, Du Pont Building, Wilmington 98, Delaware

Please send me more information on Du Pont TEFLON tetrafluoroethylene resins. I am interested in evaluating these materials for_____

*Name*_____

*Company*_____ *Position*_____

*Street*_____

*City*_____ *State*_____

*Type of Business*_____

In Canada: Du Pont Company of Canada (1956) Limited, P. O. Box 660, Montreal, Quebec.

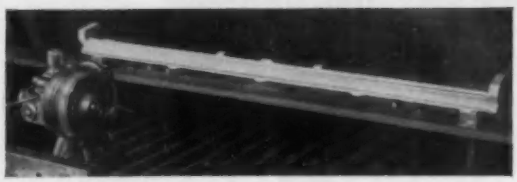
# This is the process that made possible the new aluminum engine described in the ALCOA ad on page 76-77

**It works because lightweight, hard-faced aluminum and magnesium outwear steel**

**Molybdenum, steel or stainless sprayed coatings, applied at high speed and low cost, offer many opportunities for product improvement.**

Inside cylinder wall of portable gasoline engine being sprayed with molybdenum. Part showed little or no wear after 4,000-hour test run. Chrome-plating broke down in less than 400 hours.

Aluminum torque tube, used in control of aircraft trim tabs, being hard-surfaced at end bearing sections. Molybdenum is used on these press-fit bearing sections and build up to required dimension completed with hard stainless steel.



This accounting-machine undercarriage —made of aluminum for light weight— is being hard-surfaced by metallizing with steel.

A wide range of hard metals, including molybdenum and hard stainless steel are being applied to light weight metals to provide even longer service life than is possible with solid steels, yet retaining the weight-saving advantages.

Application is relatively simple – fast, modern metallizing guns will spray over 20 pounds of stainless steel per hour. This, in the comparatively thin coatings used, usually ranging from .003" to .010", spells high-speed surface coverage. Semi-automatic control equipment is available for production line operations. Free operator training and on-the-spot service is supplied by full-time, company-trained, field engineers.

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Please have a field engineer call upon me.

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TITLE

COMPANY

ADDRESS

CITY STATE


## SAE Meeting

(*Continued from page* 63)

Any repetitive operation is fair game for automation, said speakers at the Automation Forum. Machines are of two types—selectable program machines, in which a program of operations is put into tape or cards, and may be changed; and fixed program machines, in which the sequence of operations is built into the machine. Machines of the first type are very expensive, and go largely to the aircraft industry, while those of the second type go to industry generally. A spar miller would be an example of the first, and a transfer cylinder block machine would illustrate the second. Third shift maintenance was suggested for automated departments operating on production for two shifts. Two men who constituted the third shift in a case given did all preventive maintenance for the department.

Inspection is a sore spot in industry, the quality control group stated, because it carries with it the idea of a policeman. Cost is high—7 to 20 percent. Proper quality control should be a management function, and should be considered as preventive medicine. Hidden costs of poor inspection and control procedures may include loss of customers, extras due to poor quality planning, continued use of inadequate machinery, and increased assembly costs; they may be higher than the visible costs. Acceptable quality levels may permit from 1 percent to 5 percent defective parts, depending upon the cost of locating defects as compared with the cost of making good a defective piece.

### *Parker Rust Proof New Plant*

Parker Rust Proof Co. has opened a 40,000 sq ft plant at St. Louis, Mo., where the company's line of metal surface treating products will be manufactured for the Midwest, South and Southwest. It is the Detroit firm's sixth factory. Ronald P. Gajdos, formerly manager at the Parker Mountain View, N. J., plant, has been named plant manager at St. Louis.

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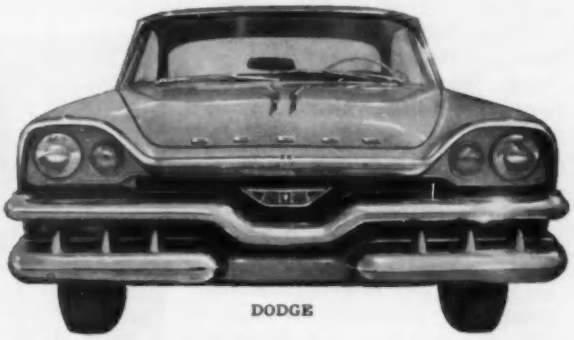

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Come rain or shine, Enjay Butyl, the weather-proof rubber for window weather-stripping out-performs and out-lasts *all other* rubbers, synthetic or natural. *Moisture-proof* and *impervious to sunlight*, this is the rubber that combines outstanding shock resistance with unparalleled life-expectancy.

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Enjay Butyl is the greatest rubber value in the world . . . the super-durable rubber with *outstanding* resistance to aging • abrasion • tear • chipping • cracking • ozone and corona • chemicals • gases • heat • cold • sunlight • moisture.

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# Secrecy Wraps Taken Off Timken Automatic Plant

(*Continued from page 53*)

dle the entire heat treating department for cones. Oil filter, cooling units, and quenching tanks are under the floor.

## Grinding

Following heat treatment, the cones are cleaned in three Almco tumblers, using granite abrasive. Face grinding of the cones then occurs, this being handled by five Gardner grinders. The capacity of each face grinder is more than sufficient to supply the needs of one cone finishing line.

One-pass Cincinnati Microcentrics, in batteries of three, five or six depending upon the line, grind the tapered OD raceways of the cones. Cycle time per cone ranges from 9 to 17 sec, varying with workpiece size. Two types of rib grinding machines are also used. One is of Timken design, incorporating a magnetic work driver, work supporting shoes and a hollow or cupped grinding wheel. The second type is a conventional Cincinnati Microcentric. The rib grinders are separate units, and run from two to four machines per line.

At this stage of the operations, the rotary distributing conveyors are first employed. Parts are fed automatically from the conveyor, in each case, into chutes leading to the grinding machines. Egress of the OD-ground cones from a machine is by chute to floor level horizontal conveyor, thence via vertical elevating magnetic conveyor to a similar distributing conveyor above the next bank of machines.

Standard Heald No. 190 Centri-Matics next grind the ID's of the cones to a tolerance of 0.0005 to 0.0008 in. depending upon the quality ordered. Cycle time ranges from 14 to 25 sec per cone. These are used in batteries of five each on four of the lines, and in a battery of nine on the small-size-cone line. Air gages, conveniently mounted at the machines and capable of a uniformly high degree of accuracy, give close control of all finishing.

## Honing

Timken-designed honing machines, using abrasive tape instead of honing stones, next finish the tapered OD raceway of the cones to an eight microinch finish. Cycle time of these machines, depending upon piece size, is from 8 to 12 sec. The abrasive tape is advanced for each cone so that a new and identical abrasive surface is presented to each cone. Results achieved are a high uniformity of finish, better clean-up of grind, and improved control of stand and taper. Four of the lines employ two honing machines each; the smaller-size-cone line has four such machines.

## Gaging, Inspection

Parts from the finishing departments are then checked on auto-

matic multi-indicator gages. Six of these gages are used on the five cone lines. Cones are checked simultaneously for overall length, OD, taper, rib length, raceway stand, and bore sizes; and any off-tolerance parts are segregated into four individual baskets according to gaged measurements.

Operated both electrically and pneumatically, the gage was cooperatively developed by Timken and Moore Products Co. It can inspect 42 cones per minute.

The pieces are then visually inspected. In this operation the inspector rolls the parts down a double turn-around runway, several at a time and using an artists' brush, and inspects all surfaces for defects. Experienced operators can examine about 5000 parts in four hours' time. Six stations (total) are provided on the cone lines for this purpose.

### Assembly

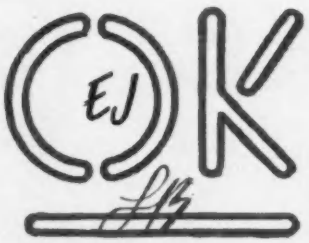
After this first visual inspection, the cones are transferred to stations where the cones, rollers and cages are assembled. Two operators are on the small-cone line, and one each on the other four lines. It was found this operation could be performed more economically with people than with automatic machines. Timken's Canton and Columbus plants make the rollers and cages on special equipment which was set up in those locations.

Cone and cage are placed in a cup-shaped fixture, and a magnetic elevator brings the rollers into a feed tube that places the rollers into the cage. When the cage is filled with rollers, a tripping device causes the feed tube to move to the next cage and cone, and the cycle is repeated. The first assembly, meanwhile, has been put into a press which closes in the cage to retain the assembly. An electric eye, when broken by the hand of the operator, sets and trips this press. Finished cones are ejected into a conveyor for the next operation. Operators can assemble as high as 1200 cone assemblies per hour.

### Final Operations

Following assembly, the cone assemblies are relayed to enclosed sound testing booths, one being on each line except for the small cones where two are employed. Here the assembly is run under load at high speed, and the operator can tell aurally whether it is satisfactory or not. In addition a dial gage measures and indicates the stand and runout. A series of lights also indicates acceptable or non-acceptable assemblies. Cycle time per assembly is only four seconds.

After sound testing, the cone assemblies receive an oil rinse in a circular storage rack and then go through a second visual inspection, being rolled down a double runway in much the same manner as during the first visual inspection. This is followed by de-magnetizing, washing, drying and slushing. The latter equipment, for the five cones lines, consists of two Ransohoff units and one Alvey-Ferguson unit. In the slushing operation, cone assemblies are coated with hot petrolatum. The parts are finally loaded into parchment-lined cardboard




Year after year more and more automotive manufacturers choose Dole. Today, Dole Thermostats are standard equipment on 38 makes of passenger cars, trucks, tractors, commercial vehicles, industrial and marine engines. This includes 19 out of 20 top passenger cars*.

Dole has earned this position of leadership through their never-ending program of research and development and their constant adherence to the highest standards of quality in engineering and manufacturing. Dole Thermostats have passed every test for accuracy and dependability under all operating conditions.

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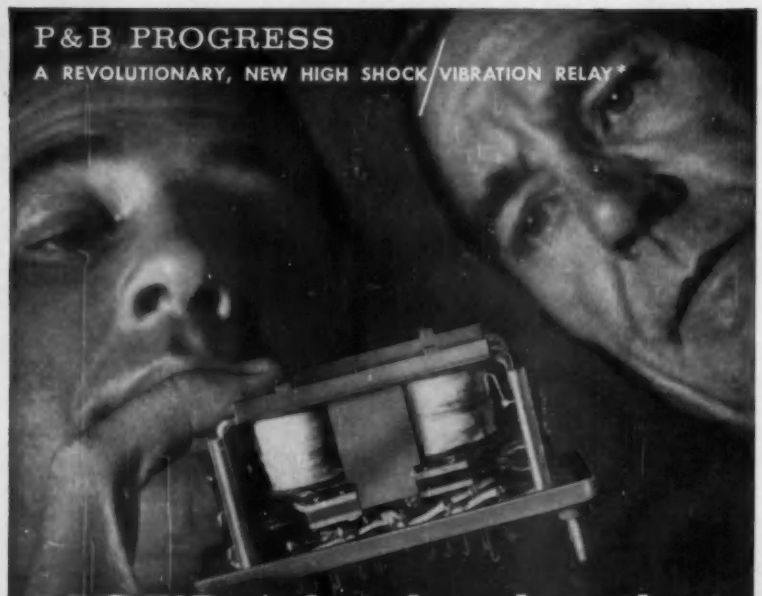

NOW! A latch relay that withstands 100$_g$ shock, 30$_g$ vibration to 2000 cps.

*ONLY 2.0 WATTS AT NOMINAL VOLTAGE FOR 12 MILLISECONDS EFFECTS ARMATURE TRANSFER*

The secret of the KG's dramatically high resistance to shock and vibration is a permanent magnet which locks the armature into position.

Tests show the contacts will open for no more than 80 microseconds during 100g shock.

Armature transfer from one set of the 6PDT contacts to another can be made in approximately 12 milliseconds with only 2.0 watts at nominal voltage.

Write or wire today for complete technical data.

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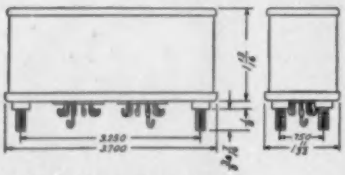
**STAR SERIES KG RELAY ENGINEERING RESUMÉ**



**DESIGNATION:** KG23DBH

**GENERAL: Insulating Materials:** Teflon, glass and ceramic.
**Insulation Resistance:** 100 megohms min.
**Breakdown Voltage:** 500 V. RMS.
**Shock:** 100g where contact openings less than 80 microseconds may be permitted.
**Vibration:** 30g 5 to 2000 cycles.
**Ambient Temperature:** —65°C to +125°C.
**Weight:** 13 ozs.
**Pull-in-Speed:** 12 MS using 310 ohm coil at 24 V. DC. (25°C).
**Terminals:** Two 11 pin multiple solder headers with hook ends for 3.20/AWG wires.
**Enclosures:** Hermetically sealed only.
**Dimensions:** 1-11/32 x 3.700 x .1-13/16 (See drawing for width, etc.)

**CONTACTS: Arrangements:** 6 pole double throw.
**Load:** Dry circuit to 3 amps, 115 V. AC, resistive. 5 amps, 28 V. DC, resistive.

**COIL: Power:** 2.0 watts at Nominal Voltage.
**Duty:** Either coil may be left energized without damage to the relay.
**Insulation:** Teflon tape.

**MOUNTINGS:** Four ⅜ inch #8-32 studs on 3⅛ x ⅜ inch centers.

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tubes by three special machines developed by Timken, and attendants seal on the tops. Loaded cardboard tubes are then placed in special corrugated shipping boxes, which in turn are placed on pallets leading to the loading dock for truck pickup.

*The second part of this two-part article, dealing principally with the processing of Timken roller bearing cups, will appear in a forthcoming issue.*

### SAE to Hold Three Meetings In Cleveland from Nov. 4-8

The SAE will hold three national meetings at the Hotel Statler, Cleveland, O., between Nov. 4 and 8. These are the Diesel, Fuel and Lubricants, and Transportation Meetings.

Highlighting the Transportation Meeting, which starts Nov. 4, will be a panel discussion on design and maintenance of light vehicles. The Diesel Engine Meeting opening Nov. 5, will hear technical papers on two-cycle Diesels, fuel systems, and Diesel lubricants. The Fuel and Lubricants Meeting opens Nov. 7, and includes papers on fuels for high-compression engines, and road and laboratory antiknock studies.

The SAE L. Ray Buckendale Award will be presented at the Nov. 5 session of the Transportation Meeting to R. M. Riblet and C. M. Kitson, of Timken Roller Bearing Co. for a paper on bearings for heavy-duty axles.

J. M. Campbell, of General Motors Corp., will receive the SAE Horning Memorial Award at the Nov. 7 luncheon of the Fuel and Lubricants Meeting for a paper on mutual adaptation of fuels and engines.

### Dana Corp. Is Marketing New 12-Speed Transmission

Dana Corp. has developed and is now marketing a new lightweight, 12-speed transmission for use in heavy-duty trucks.

The unit was developed to meet the need for a multiple-speed, heavy-duty transmission shorter and lighter than any comparable unit previously available, company officials said.

The new transmission is 12 in. shorter and 200 lb lighter than any other multiple-speed transmission of similar capacity, according to company spokesmen.


Executives Read
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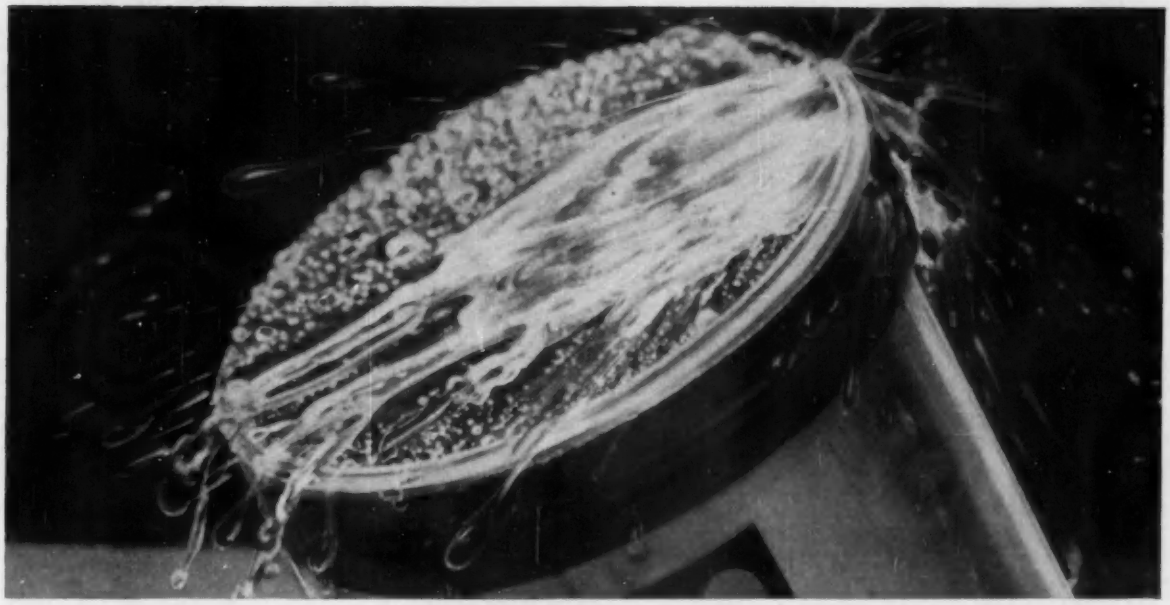
## SPLASH TEST PROVES THIS TAPE IS

# WATERPROOF



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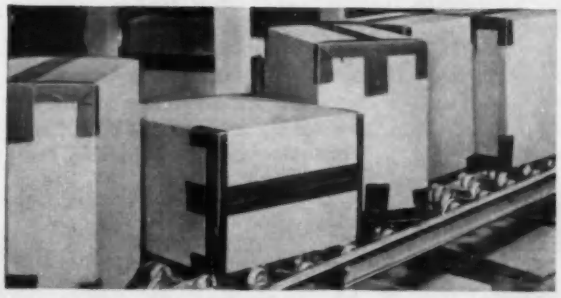

**Use less tape** . . . and less expensive tape . . . for assembly-line packaging. Low-cost *Polyken* Waterproofs provide vital protection against careless handling and exposure.

**Protect contents** from moisture and air. In this case, ink cans are sealed with a high-quality *Polyken* Tape that grasps quickly and firmly, yet pulls off without a struggle.

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City_____ Zone____ State_____

# Report from the Farm Equipment Industry

(*Continued from page* 69)

ing a three-bottom plow could handle the six-row equipment in ordinary going, if the three-bottom rating was conservative. All of the six-row equipment could be operated by a tractor rated for a four- or five-bottom plow, they agreed. The company's large row-crop tractor rated at about 60 hp was being used by Deere & Co. for its demonstrations, and International Harvester suggested its own large row-crop tractor as motive power for its equipment.

Six-row implements are not suitable for use in extremely rolling country, the engineers stated. Even four-row equipment is at a disadvantage in such going. In flat or gently rolling country, however, the six-row devices have some advantages in handling over the smaller sizes in that they can turn more gradually. That is, in working with two-row implements, the tractor finishing a row must make a sharp 180 deg turn to work back in the next furrow, but with four-row or six-row equipment the tractor must make a wider swing to pick up the next furrow for the return. In general, the plains states, the southeast, and some parts of the northwest are probably the best markets for the six-row agricultural machinery.

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Alloy No. 7
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WAUSAU ALLOY NO. 7 is an alloyed cast iron produced by the electric furnace method, with a hardness of Rockwell C 50-60. This unusual hardness resists mechanical pounding at high temperatures. The material is corrosion and erosion resistant and distortion and cracking are eliminated by a special process. Alloy No. 7 seats are ideally suited for a wide range of applications where moderately heavy duty performance and low cost are factors. Call or write
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## Increased Productivity

A COMPARISON of agricultural and nonagricultural employment is given in a paper from the research department of the Federal Reserve Bank of Chicago, along with the production volume of industry and the farm. Figures given are:

| | 1957 July | 1957 June | 1956 July | 1949 July |
|---|---|---|---|---|
| Employment | | | | |
| Farm, in millions | 7.8 | 7.5 | 7.7 | 11.0 |
| Non-agricultural, millions | 59.4 | 59.0 | 59.0 | 35.9 |
| Production, physical volume, 1947-49 = 100 | | | | |
| Industrial | 144 | 144 | 136 | 66 |
| Farm marketings | 114 | 97 | 112 | 76 |

These figures would indicate that industry, with tremendous capital investment in mechanization, increased its productivity 120 per cent while increasing its labor force 65 per cent; agriculture increased its productivity 52 per cent while decreasing its labor force 29 per cent.

## Transportation Problems

A DIFFICULTY with the wide equipment is in transportation, and in handling on the farm when not actually in operation. Figuring upon a basis of a standard row of 38 to 40 in., six-row equipment is about 20 ft wide. It would be practically impossible to move such equipment, mounted, over a busy highway. Most of the equipment is made to be broken at two-row width by means of hinges in the frame, or by other devices that permit detachment of part of the unit. A planter that cannot be broken through its width is made to be towed endwise. The equipment would be difficult to take

through fences or farm gates, also, unless some means of breaking down the width were provided.

With two-row, four-row, and now six-row farm implements in actual production by the farm equipment industry, and in use by farmers, what is the outlook for eight-row equipment? Engineers agree that the prospect for seeing still large implements in use in the near future is very dim. All of the difficulties in transportation, and with working in rolling terrain, that confront the user of six-row implements would be accentuated in still wider equipment. While no manufacturer of agricultural machinery will say that he is not considering eight-row devices, they all agree that there is not now any plan for producing such equipment.

## New Balers

JOHN DEERE has announced two new additions to the baler line —the new 214-W Wire-Tie and the 214-T Twine-Tie balers. These new balers are bigger, heavier versions of the family-sized John Deere 14-T Twine-Tie baler. They make bigger, heavier, more dense bales. The new 214 Series balers make bales up to 80 lb, although they will make sizes to suit the operator in lengths from 8- to 50-in.

The 214-W Wire-Tie baler is particularly adaptable for commercial hay growers and large operators who stack bales in the field. The baler meets requirements for growers who prefer more dense twine-tied bales. Both the 214-W and the 214-T feature bale groovers permitting twine or wire to snuggle into the bale, reducing snagging or slipping in handling.

The 214 Series balers feature a combination overrunning and slip clutch on the power take-off . . . combination slip clutch and shear assemblies in the flywheel . . . slip clutches in the auger and pickup drives to provide protection against shock loads.

John Deere 214-W Wire-Tie balers and 214-T Twine-Tie balers are available for PTO operation or with a 26.5 hp Wisconsin engine, regularly equipped with self-starter.

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precise and remote control

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The new B&D Magnetic Drill Press is so loaded with user-wanted features—that it just has to be seen to be appreciated. To see it at work on your own application, mail coupon below for a free demonstration.

For instance: Its exclusive two-piece construction makes it simple to position the magnet. The built-in drill point locator makes accurate placement effortless. An easy twist of the 1¼" capacity drill press unit locks it in place on the magnet.

And it's there to stay! Extra power magnet clings to ½" and thicker steel with a giant's grip. This new B&D Magnetic Drill Press needs no cool-off period. It's stable in any direction, provides highest accuracy at all times.

Like the full line of B&D Portable Drills, this new tool is power-packed, quality built. See it for yourself. Mail coupon for free demonstration to THE BLACK & DECKER MFG. CO., Dept. 1410, Towson 4, Md. (In Canada: P.O. Box 278, Brockville, Ont.)

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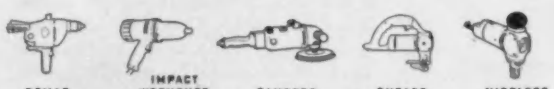
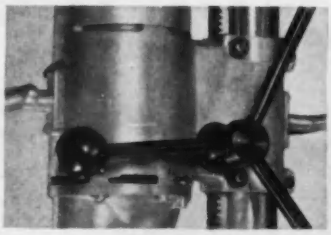
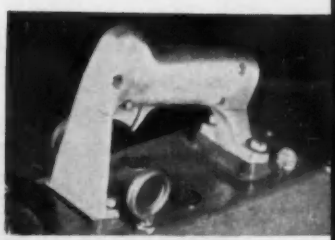
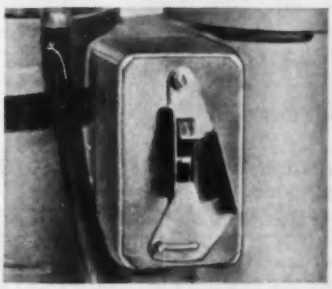


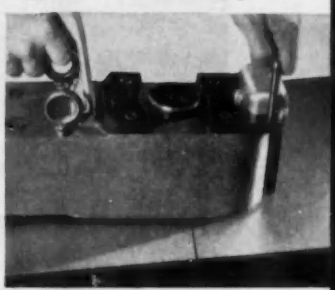
UNITIZED CONSTRUCTION of drill press cannot work loose, no side play, maintains highest accuracy.



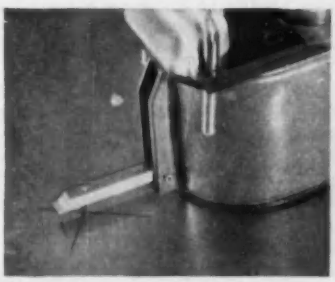
SAFETY-GRIP SWITCH keeps magnet always "on" after operator releases switch trigger—another safety plus.



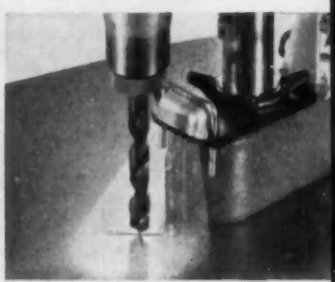
REVERSING SWITCH with time delay prevents motor being reversed too rapidly. Adds longer life—increases safety.



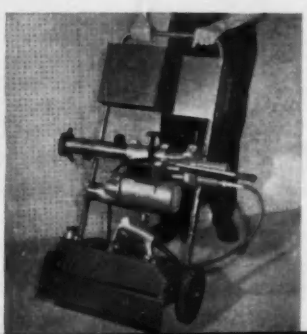
VERSATILE MAGNETIC UNIT can be used apart from drill press to hold pieces for butt welding and other jobs.



DRILL POINT LOCATOR provides accuracy never before possible. Gets close tolerances fast. Built into magnet.



EXCLUSIVE HEADLIGHT directs bright beam on work area. Special ruggedized bulb withstands hard usage.



EXCLUSIVE TWO-PIECE CONSTRUCTION (magnet separate from drill press) and tool caddy for easier, safer handling. Caddy keeps tool in one place—ready for the job. Unit placed in position with minimum exertion.

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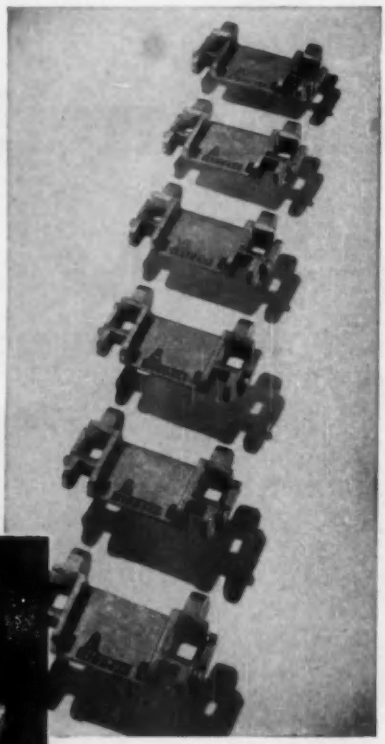
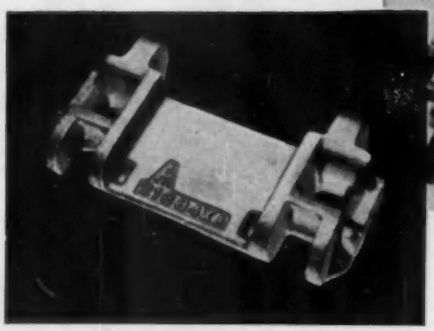
RIGHT

DIRECTION . .





Today's Modern Miner does BETTER

with UNITCASTINGS!

Real proof of the continuous high quality of Unitcastings is the fact that more than 99 percent of the total production of 250,000 treads has been accepted!

Continual operation in underground grit and dust subjects mining machinery treads to extreme abuse. Replacement is difficult and expensive, particularly on this section of the equipment, and parts must be made to last!

For over a decade, the abrasion-resistance quality of Unitcast's T-Loy 34 has answered this tread problem—as well as many other special parts for the same equipment.

Take a step in the right direction, too—*you'll do better with Unitcastings!* They're Engineered!

UNITCAST CORPORATION • Toledo 9, Ohio

*In Canada: CANADIAN-UNITCAST STEEL, LTD., Sherbrooke, Quebec*

Unitcast

SPECIFICATION STEEL CASTINGS

# Production Equipment

(*Continued from page 87*)

## Pneumatic Die Grinders

Two new midget pneumatic die grinders for use in precision grinding, filing and cutting jobs have been developed as additions to a new line of pneumatic production tools. The model 200 grinder operates at speeds up to 60,000 rpm and weighs only 4 oz. Length of the unit is 4⅞ in. with a diameter of ⅝ in., and it has a ⅛ in. collet chuck. The 300 model operates at speeds up to 38,000 rpm and weighs 12 oz. Length of this grinder is 5¾ in. and it has a diameter of 1 1/16 in. This model is equipped with a ¼ in. and a ⅛ in. collet chuck. These grinders feature a push type throttle for speed control. Due to operating speeds and ball bearing construction, the 200 and 300 series grinders should be connected to an air line that has a fog type lubricator-filter available as an accessory part. *The Airetool Mfg. Co.*

Circle 54 on postcard for more data

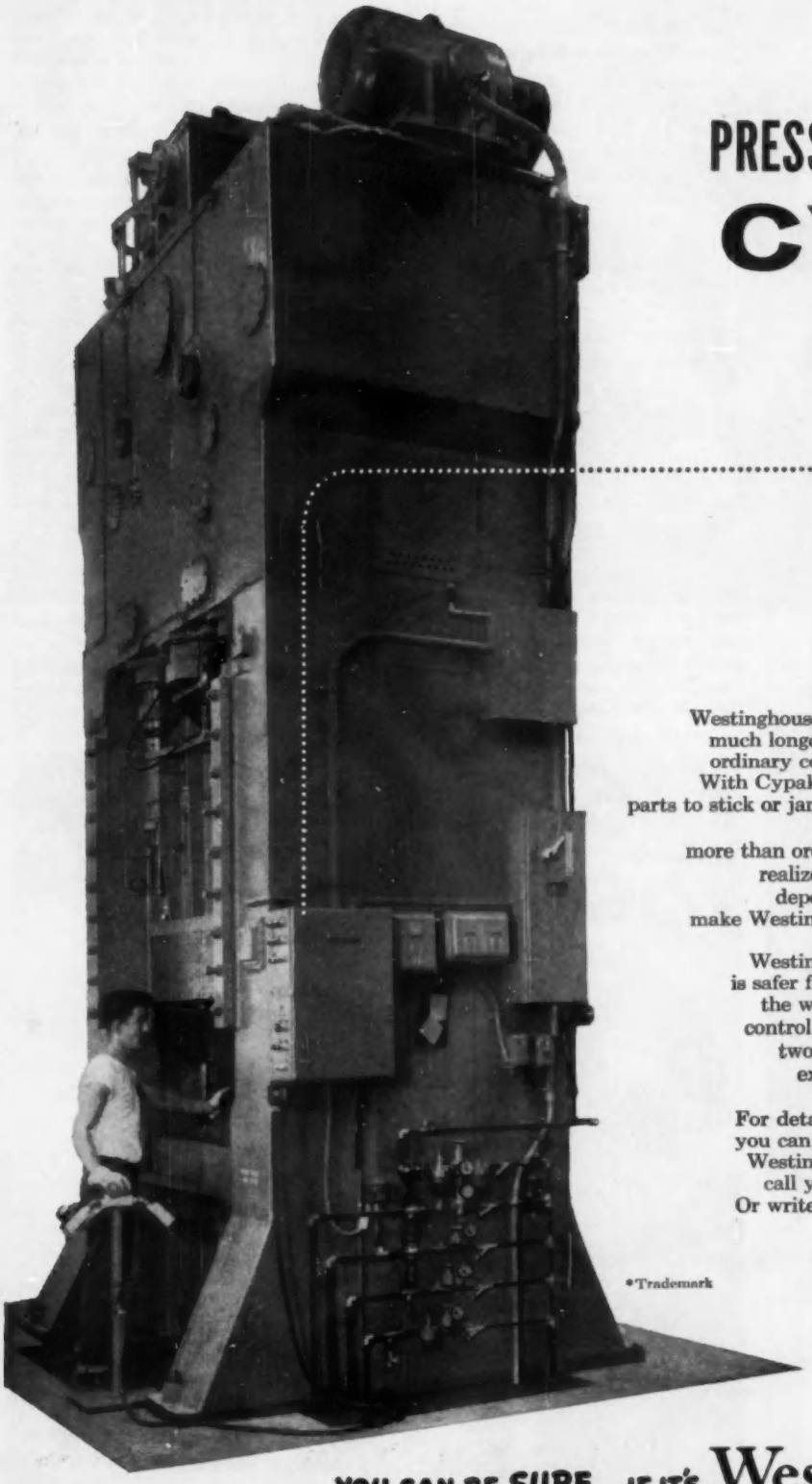
## Dip Process Machine

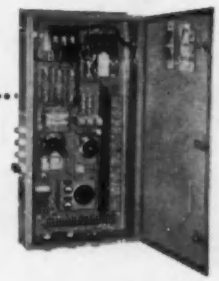
A DIP process machine which indexes automatically for multiple-stage finishing operations has been developed. This indexing machine dips baskets of parts in a series of tanks as the baskets travel suspended from a single, closed-loop monorail conveyor. The operation is entirely automatic, from the first dip through conveyor unloading. The new unit can be adapted to any dip process and the tanks are only long enough to permit entry and processing of parts. As the conveyor indexes in transit, the baskets of parts are automatically submerged for processing; when the conveyor again indexes, the baskets are raised and positioned for the next cycle. The automatic indexing is actuated by a floating cam which operates air cylinders spaced at 48 in. O.C. throughout the length of the conveyor system. Air cylinders are supplied from a single flexible manifold attached from cylinder to cylinder, which is in turn supplied from a rotating hose in the center of the system. An electric timer controls the indexing operation of the conveyor. The use of stainless steel, lead, and rubber tanks makes the machine applicable for pickling processes. *Cincinnati Cleaning and Finishing Machinery Co.*

Circle 55 on postcard for more data

# LASTS 15 TIMES LONGER, YET COSTS LESS THAN $200.00 MORE

## WESTINGHOUSE PRESS CONTROL WITH CYPAK





Westinghouse press controls with Cypak* last much longer . . . up to 15 times longer than ordinary controls using conventional relays. With Cypak static control there are no relay parts to stick or jam and cause a repeat of the press. Priced at less than $200 more than ordinary press controls, the savings realized from many additional years of dependable, maintenance-free service make Westinghouse press control with Cypak your most economical buy.

Westinghouse press control with Cypak is safer for the operator, the machine and the work. Patented anti-repeat clutch-control circuit is self-checking, requiring two impulses to initiate a stroke. An externally operated circuit breaker is an additional safety device.

For detailed information about the ways you can benefit from safer, longer lasting Westinghouse press control with Cypak, call your Westinghouse sales engineer. Or write to Westinghouse Electric Corp., 3 Gateway Center, P.O. Box 868, Pittsburgh 30, Pa.

*Trademark

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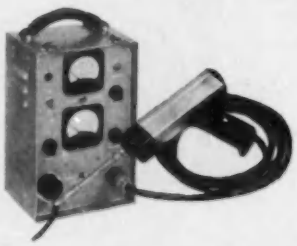
YOU CAN BE SURE... IF IT'S Westinghouse

# SNIFFS LEAKS IN SECONDS



**GENERAL ELECTRIC'S HALOGEN LEAK DETECTOR**—Type H-1—locates leaks in seconds . . . enables you to test complete units in minutes. Compact, lightweight, and portable, the supersensitive H-1 detector requires no special operating skill. Its extreme sensitivity, fast response, and versatility make the H-1 the most useful and positive leak detector available . . . and at a low cost to you.

GENERAL ELECTRIC

To find out how the H-1 leak detector can be applied in your work, fill out and mail coupon to: General Electric Company, Section E585-60, Schenectady 5, N. Y., or call your nearest General Electric Apparatus Sales Office.

Name_____
Title_____
Company_____
Street_____
State_____
Application_____


# Industry News

(*Continued from page* 39)

### *Firestone Sales, Earnings Establish Nine-Month Record*

Firestone Tire & Rubber Co. sales and earnings for the nine months ended July 31 set an all-time record and showed an increase of nearly 4 per cent over last year. Sales were $844,603,697 compared with $813,750,210 in 1956 (up 3.8 per cent) and earnings amounted to $44,583,808, up 3.9 per cent from the $42,904,733 recorded in the same period a year ago.

### *Massena Plant Construction Slated to Begin This Month*

Chevrolet Div. expects to begin laying foundation this month (Oct.) for its new 180,000 sq ft aluminum foundry at Massena, N. Y., and structural steel will start going up around Jan. 1. Manufacturing operations are scheduled to begin in June, 1959.

The Massena plant will make aluminum castings for engines and transmissions to go in Chevrolet passenger cars and trucks. Molten aluminum will be supplied by a nearby Reynolds Metals Co. plant now under construction. The Massena foundry will employ about 700 persons.

### *Truck Exports Ahead of '56 But Car Shipments Decline*

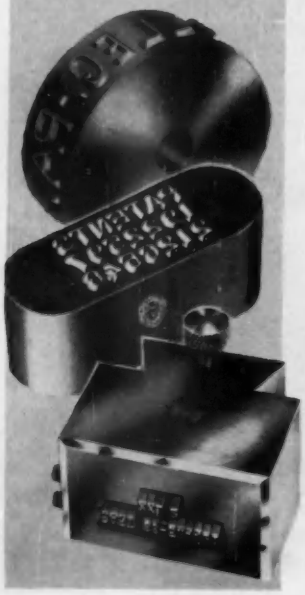
Exports of motor trucks are running about 3 per cent ahead of last year, although passenger car shipments have taken a dip of more than 25 per cent, due in part to the slump in the Canadian market. As a result, total motor vehicle exports are off about 12 per cent.

Through July, truck shipments totaled 129,840 units, up 2.7 per cent from 126,448 during the same period a year ago. However, truck shipments to Canada dropped from 7,378 last year to 4,162 this year.

But while truck exports, particularly non-Canada shipments, are up, passenger car shipments have dropped sharply from 133,780 to 98,300, or 26.5 per cent. The 1956 figure was bolstered by heavy shipments to Canada during February, March and April, when Canadian output was cut by a strike. Passenger car exports to Canada dropped from 31,818 to 10,672.

Canada's automobile industry has suffered an 11.4 per cent slump this year, dropping from 286,901 passenger cars to 254,110 this year through July. Truck output also has decreased from 69,272 to 53,909. Both Canadian market sales and exports to other countries are down.


6/1000¢ PER MARK!



A recent report from a Matthews Die user, marking steel parts, proves the almost negligible cost of marking with Matthews Dies (581,800 marks without change-over). Engineered engraving, plus skilled treatment of the high quality steels we use, will give you such results, too!

- stamping dies
- roller dies
- interchangeable holders & type

FOR *ANY* MARKING APPLICATION

Send sample part or drawing for complete marking recommendations.

JAS. H. MATTHEWS & CO.
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OFFICES IN PRINCIPAL CITIES
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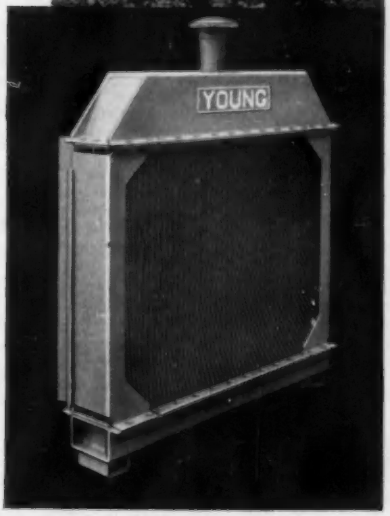
# Young MONO-WELD® RADIATORS *Chosen again!*

Model
## 800 CASE® TERRATRAC®
*Crawler Tractor Shovel has the best of everything to assure Superior Performance*

## Young RADIATORS selected for EXTRA strength ...maximum cooling

Developing up to 20,000 lbs. of "crowding power" for digging hard materials puts a tremendous work load on this Case Tractor-shovel engine — and calls for a dependable cooling job by its radiator. Good reason for Case to utilize Young **MONO-WELD®** radiators . . . their extra strength and cooling capacity fit Case's "best-of-everything" standards. Patented features of Young Radiator cores insure maximum heat transfer and dependable ruggedness. Young Radiators are made for automotive engines in cars, trucks, buses, tractors, locomotives and stationary engines. Call on Young for the solution to your heat transfer problems.




**Young Radiators are used where the going is tough!**

**Young RADIATOR COMPANY**
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*Creative* HEAT TRANSFER ENGINEERS
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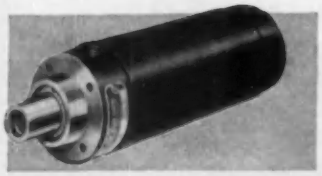
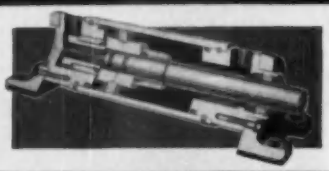
Write Dept. 107-K for Catalog 148-A

# O-M
## COMPACT IN DESIGN
## KING SIZE IN PERFORMANCE



**O-M Tie-Rodless Cylinder**
**150 psi Air — up to 1500 psi Oil**



**Meets JIC Standards**
**Fits Where Others Won't**

Here's the famous O-M Original Tie-Rodless Cylinder that takes one third less installation space than conventional tie-rod type yet packs plenty of power on both air or hydraulic circuits.

The result of modern research, design and engineering know-how, this powerful O-M component figures importantly in today's automation picture. Its high operating efficiency and ease of maintenance combine with its space-saving design and rugged construction to make it highly desirable in any application where its capacity meets specifications. Ports are easily oriented to any position.

*O-M Air and Hydraulic Tie-Rodless Cylinders are available in a complete range of sizes (1 1/2" to 8" bores) with standard or heavy duty rods. Completely interchangeable parts and mounts. Immediate delivery on many sizes.*

*Mail coupon now for Bulletins 101A (O-M Tie-Rodless Air and Hydraulic Cylinders) and 105 (O-M Series T-H Heavy duty Hydraulic Cylinders).*

**ORTMAN-MILLER MACHINE CO.**
17 143rd Street, Hammond, Indiana

☐ Have representative call
☐ Send Bulletins 101A and 105

Name_____ Position_____
Company_____
Address_____
City_____ Zone___ State_____


# SHORTIES

Operational communications flowing between city offices of one major U. S. airline would fill the pages of 300 book-length novels each month.

•

An air conditioner for a new U. S. aircraft occupies an 18-in. cube, weighs but 35 lb, yet is powerful enough to cool five average homes.

•

In 1955, 1.4 million gasoline pumps poured almost 48 billion gal of gasoline into the fuel tanks of the nation's motor vehicles. This flow supplied the liquid power for travel over U. S. highways that averaged a million miles every minute of the day.

•

As many as 30 types and grades of petroleum products may be traveling through a pipe line at one time.

•

According to one estimate, 400 new uses for petroleum chemicals are being found every year.

•

One economist estimates that the U. S. will use about 415 billion barrels of crude oil between now and the year 2000 — more than one and one-half times the total oil discovered in the world to date.

•

A major steel company has reported that it uses about 22 gal of fuel oil for each ton of steel produced.

•

About 75 to 85 per cent of the rubber in the average passenger car black tire is made in America from oil and gas derivatives.

•

More than 46 million of the nation's 65 million vehicles, or two out of every three, are registered in those 34 states which have no official, state-wide program to periodically check vehicle condition.


# FAST
## PRODUCTION OF NEW PRODUCT
*Fabrications*
FOR QUICK DELIVERY OF

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GUIDED MISSILES, TURBO JETS,

COMMERCIAL PLANES, PARTS,

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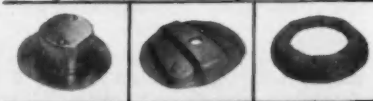

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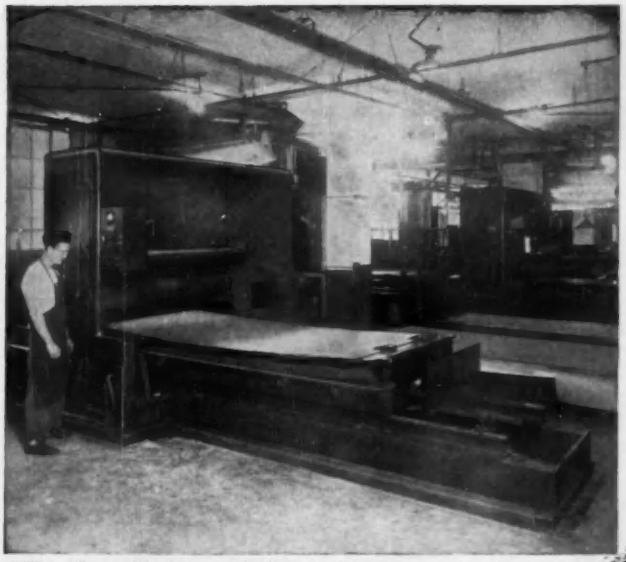


*HILL Sheet Grinder and Polisher with reciprocating hydraulic table processing individual sheets.*

# HILL

## GRINDING and POLISHING MACHINES

**How much is it costing you to produce ACCEPTABLE finishes on FLAT surfaces**

*HILL Pinch Roll Grinder and Polisher for "Wet" or "Dry" operations. (Shown in series for straight line production)*

**HILL** 2-Roll Vertical Abrasive Belt Grinding and Polishing machines are the logical result of 25 years of research and experience in producing self contained units for successfully processing ferrous and non-ferrous sheets. We have consistently proven that wide abrasive belt grinding and polishing equipment must incorporate these fundamental features — rugged construction, simplicity of design, accessibility, versatility and centralized controls.

HILL abrasive belt polishing machines are recommended for continuous operation and insure lower production costs with superior finishes as required today by the manufacturers of decorative plastics, food processing equipment, automobile bumpers, lithographers and photo engravers plates, home appliances, etc., etc.

Both types of machines are normally built up to 60″ wide, and larger capacity equipment can also be furnished.

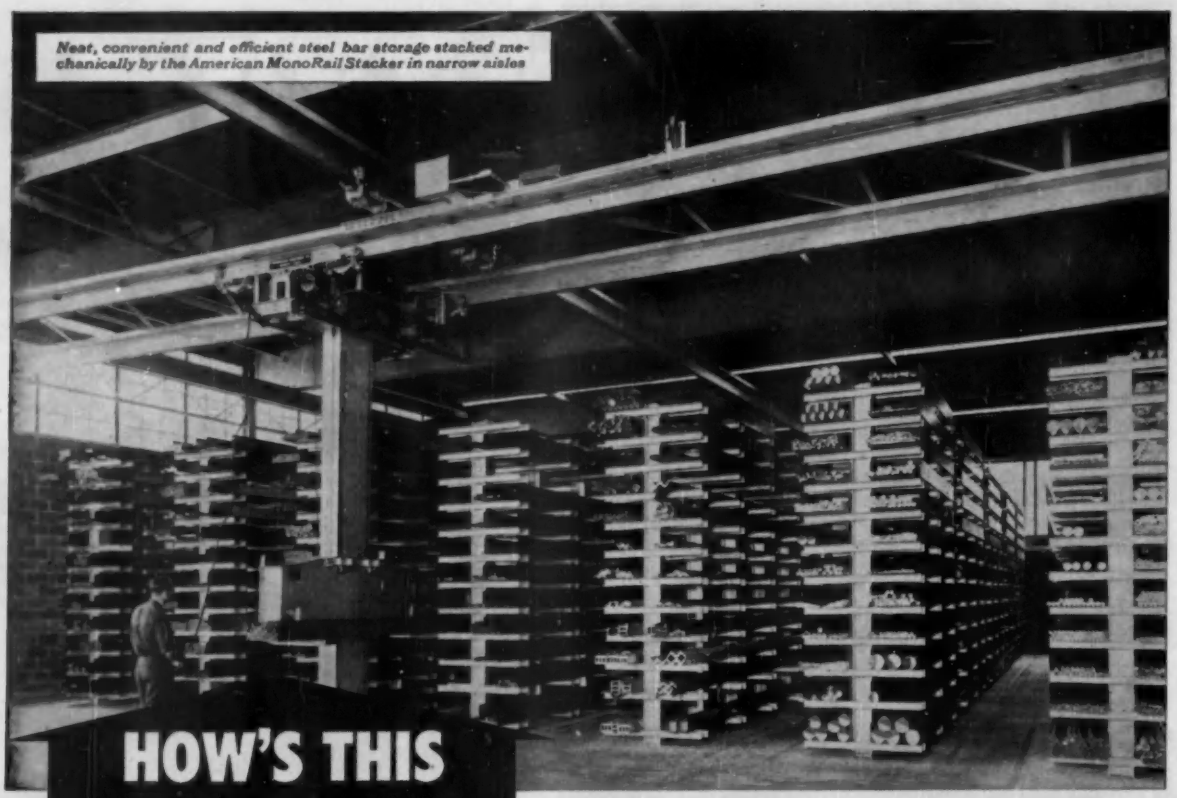
Your inquiries are solicited for detailed information and recommendations.

HILL ACME TOOLS FOR INDUSTRY

# THE HILL ACME COMPANY

**ACME MACHINERY DIVISION** • **1209 W. 65th St., Cleveland 2, Ohio**
ESTABLISHED 1882

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING & POLISHING MACHINES
HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES

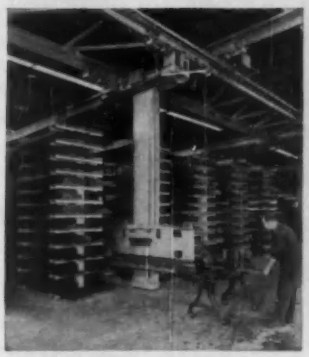


*Neat, convenient and efficient steel bar storage stacked mechanically by the American MonoRail Stacker in narrow aisles*

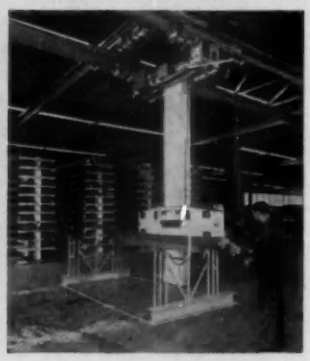
# HOW'S THIS FOR STEEL STORAGE!

American MonoRail engineers, working with Hawkridge Brothers Company, designed this system for storing bars, rods and other long steel shapes.

Note the extremely narrow aisles and maximum height of racks. Bars and rods, 20-22 feet long, are placed in pans 18 feet long. The American MonoRail Stacker transfers these pans to either side of an aisle for storage.



*MonoRail Stacker forks support bar in saw. Saw with extension rolls to any convenient spot in the warehouse.*



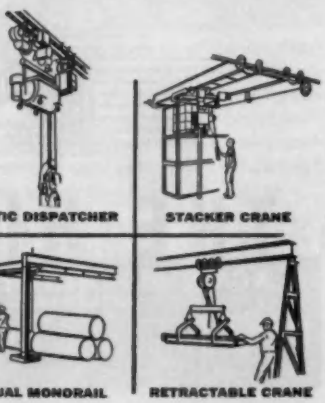
*American MonoRail Stacker lowers a banded bundle of bars over prongs which ingeniously splits bands, lets bars roll into trough for pick-up in a tray.*

*Photos: Courtesy of Hawkridge Brothers Company, Waterbury, Conn.*

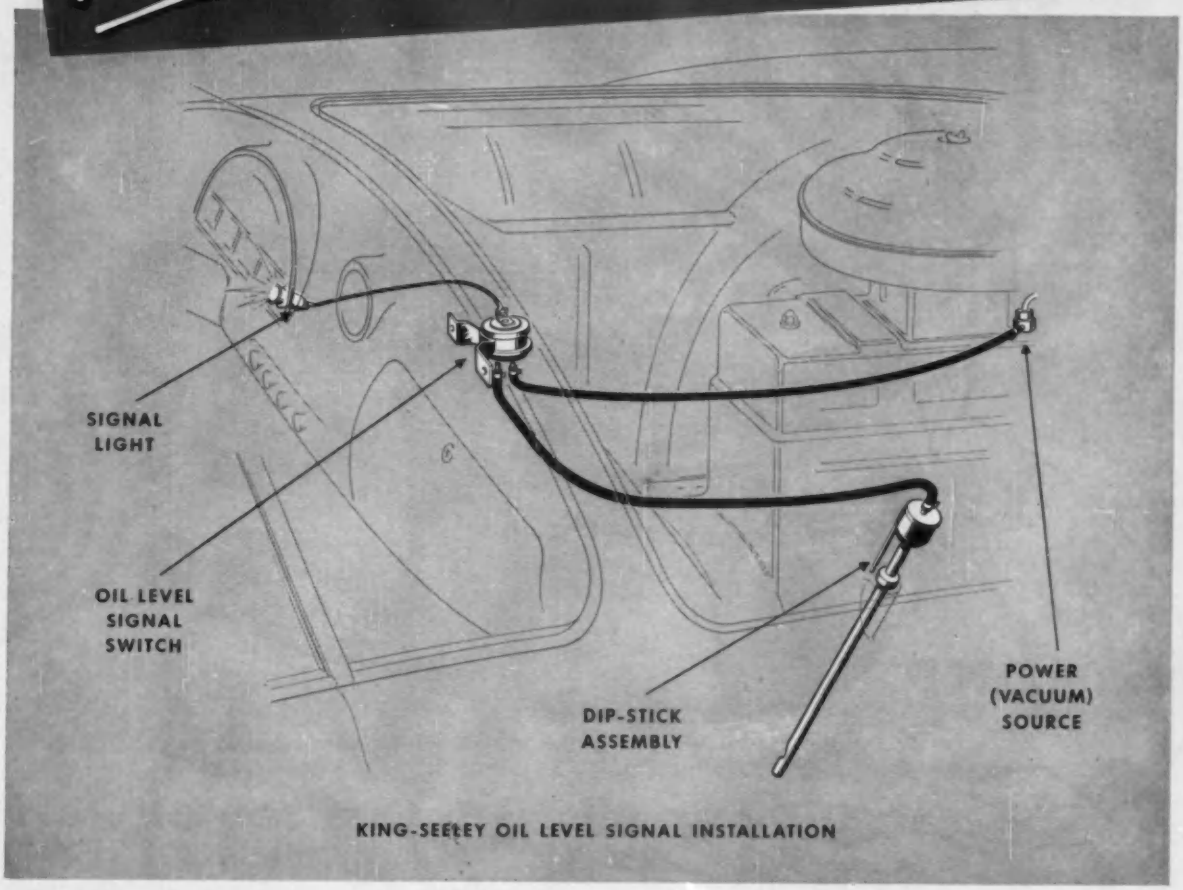
**Member of Materials Handling Institute - MonoRail Association**

AMERICAN
# MONORAIL
COMPANY

13147 ATHENS AVENUE, CLEVELAND 7, OHIO (IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)



# NEW ELECTRIC DIP-STICK Cautions Driver to Add Oil




KING-SEELEY OIL LEVEL SIGNAL INSTALLATION

The new K-S Oil Level Signal is always a trustworthy advisor. Whenever crankcase oil drops to the "add-oil" level a dash light immediately warns the driver. And, the signal is not affected by oil sloshing on curves, hills or rough roads.

The driver never has to raise the hood to check his oil. Never has to depend on anyone else to tell him when he needs oil. And he never need waste oil by overfilling.

**IMPORTANT:**—No car design changes are necessary for installation. The K-S Oil Level Signal is equally applicable to all cars.

The added convenience and security you can offer your customers by the use of this device will far outweigh its nominal cost.

KS

**KING-SEELEY CORPORATION**

ANN ARBOR, MICHIGAN

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THIS SKF

*Red Seal* IS YOUR BEARING INSURANCE

When ball bearings are invaded by external dirt, life is cut short. If dirt can get in, so can other contaminants... and lubricant can leak out.

But when the SKF Red Seal is used... dirt and moisture are repelled and lubricant is positively retained until replaced.

DuPont Fairprene, the material of the Red Seal, remains unaffected by lubricants, heat, ageing and moisture. Reinforced by a securely staked steel retaining ring, it provides maximum sealing, lightest contact, lowest friction—for the life of the bearing.

Designed for use by manufacturers of motors, portable tools, household appliances and other equipment requiring efficiently sealed bearings. Available in all standard S.A.E. widths, fully interchangeable with non-sealed bearings. 7753

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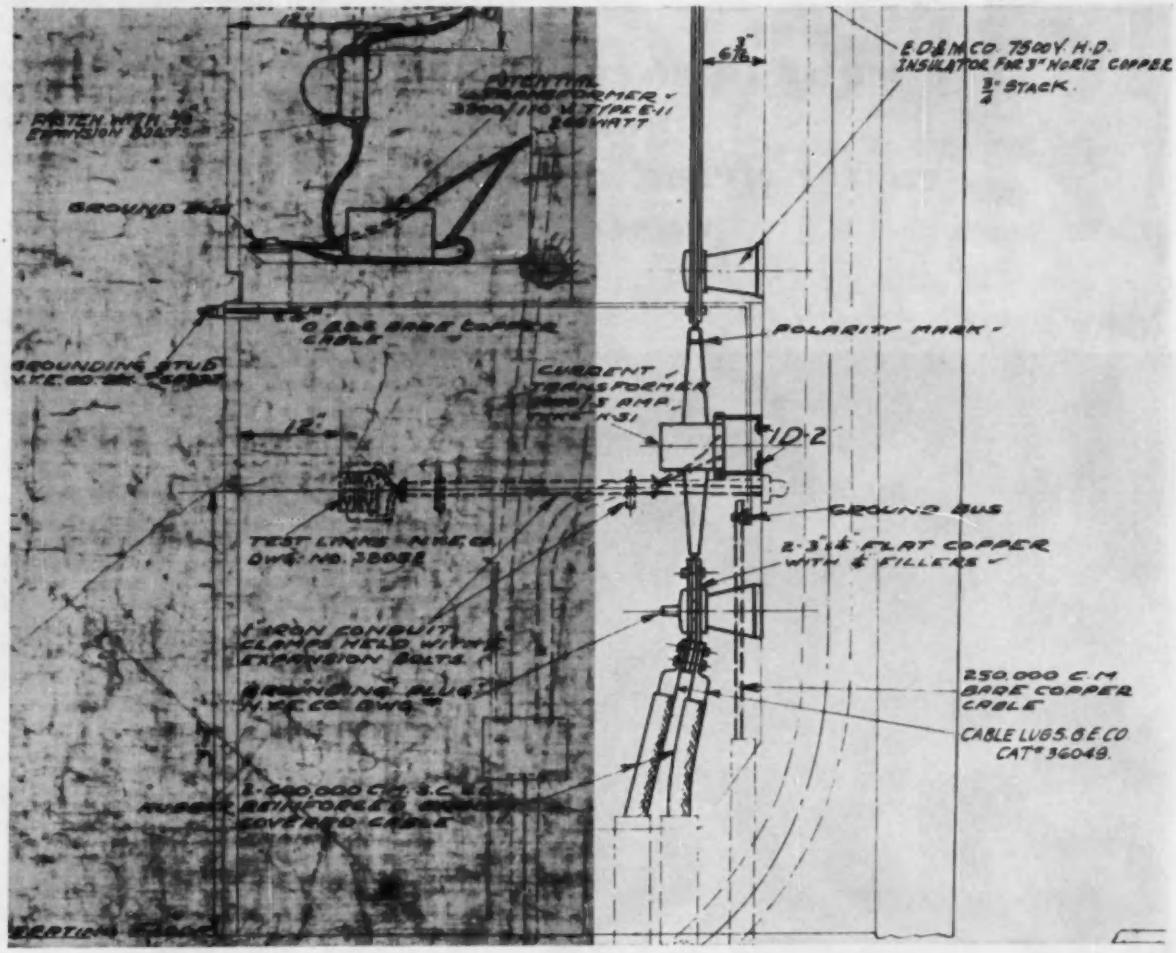


# How to get better copies of your drawings

Here are two white prints spliced together for your comparison. The copy on the left was made from a sensitized cloth intermediate. This intermediate, and the print produced from it, bear the same scars of age and wear as the old original drawing.

To make the copy on the right, the worn original was reproduced on CRONAFLEX, Du Pont's amazing new engineering reproduction film. See how the CRONAFLEX intermediate has eliminated the kink marks, cleaned up the smudging, actually improved the drawing.

CRONAFLEX improves the copies of your drawings for several reasons. First, the physical characteristics of the films eliminate the kink and smudge marks from the prints. Second, the high contrast of CRONAFLEX gives you better intermediates, which means more legible blue or white prints. Third, because of the unexcelled matte surface of CRONAFLEX, you can do additional drafting or make corrections on "second originals" quickly, easily, and accurately.

CRONAFLEX engineering reproduction films are extremely versatile. They are available in three types: Direct Positive, Contact and Projection. All CRONAFLEX films are on Cronar® base, assuring unbelievable ruggedness, high dimensional stability, minimum moisture absorption.

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Let us resharpen one of your typical inserted blade cutters. This free demonstration, on a new Ingersoll Cutter Grinder, will tell you what you can expect to save, by replacing standard tool grinders or Ingersoll grinders of obsolete design with new Ingersoll machines.

Accurately ground cutters assure time and dollar savings, longer tool life, better tool and machine performance.

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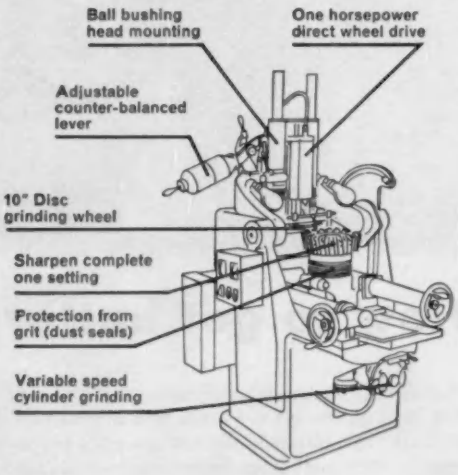
4" to 30" Diameter Cutters. Accuracy is assured. Grinds both periphery and face in one setting. Simple and easy to operate. Faster than Universal Grinders. Grinds a constant clearance.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# CUTTER DIVISION

## THE INGERSOLL MILLING MACHINE COMPANY

ROCKFORD ILLINOIS

# ENTER THIS CONTEST ...90 CASH PRIZES!

**CONTEST RULES**

1. Tell in 25 words or less "Why I prefer Albanene tracing paper."
2. Send all entries to K&E Albanene Contest, Box 160, New York 46, N. Y. Enter as often as you wish. There is nothing to buy.
3. Entries must be postmarked not later than midnight, Nov. 30, 1957.
4. Entries become the property of Keuffel & Esser Co. None can be returned.
5. The decision of the judges is final.
6. Winners will be notified by mail. A complete list of winners will be sent upon request, providing request is accompanied by stamped, self-addressed envelope.
7. Contest is open to all residents of continental United States, except employes, and their immediate families, of Keuffel & Esser Co. and its subsidiaries and dealers; its advertising agency; and judges of this contest.
8. Also not applicable to residents of those states where there are prohibitory laws.

## Why I prefer ALBANENE® Tracing Paper...

**First prize . . . . . $1500**
**Second prize . . . . . $1000**
**Third prize . . . . . $ 500**

**plus 87 prizes of $25 each!**

In 25 words or less, tell us why you prefer K&E Albanene® tracing paper. Your reasons may win one of these 90 prizes (it's K&E's 90th anniversary).

**Here's a hint:** Albanene is made from 100% rag stock for superlative tear strength. It is permanently transparentized with an inert resin. Draftsmen like it because of its easy drawing qualities . . . reproduction men for its high transparency and permanence. Everybody likes it because "what you pay for stays in the paper." That's why Albanene is the best seller among *all* tracing papers.

**Get contest aids** from your K&E dealer: Information booklets, extra contest entry blanks, samples of Albanene, too, if you need them. You can enter as often as you please.

Or use a plain sheet of paper if someone's already snipped the blank below. Give your name, address, and firm name, twenty-five words or less telling why you prefer Albanene tracing paper, and mail to K&E Albanene Contest, Box 160, New York 46, N. Y. before midnight, November 30, 1957.

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*Street*_____ *Firm Name*_____

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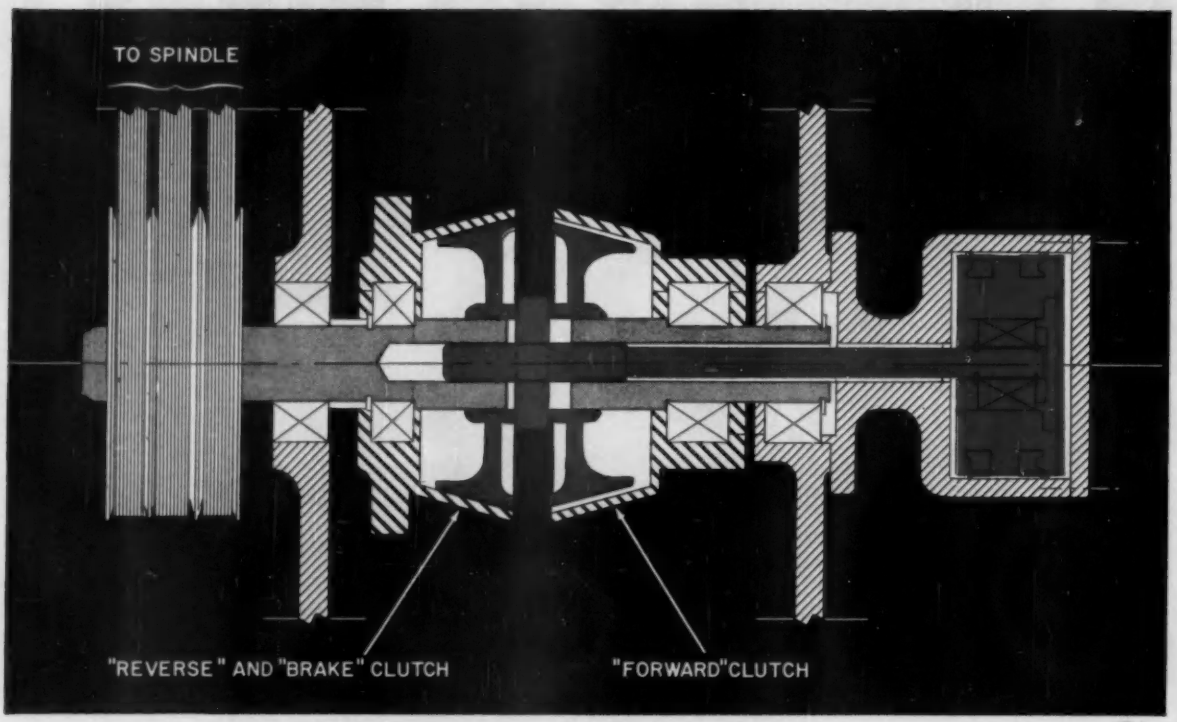
# NOW: A Spindle Reversing Clutch That Never Needs Adjustment! Requires No Warm-Up Period!




57-A

Can you think of *any* other screw machine that offers these important cost saving features . . . ?

ACCURACY: Reversing point repeats within ¼ spindle revolution. Even taper pipe threading becomes an ordinary operation with the new Screwmatic 750.

RELIABILITY: Wear will not affect clutch tension or reversing point accuracy.

SIMPLICITY: Constant air pressure of piston acts directly on clutch. No adjusting is ever required.

RUGGEDNESS: Roughly 1000 pounds pressure is applied to clutch cones to insure positive spindle drive.

VERSATILITY: Select most efficient time cycle—spindle will reverse at same point regardless of time cycle gears selected—no high-to-low speed ratio limitations.

ECONOMY: In many cases this new Screwmatic reversing spindle has eliminated the need for left-hand tooling entirely.

AN IMPORTANT NOTE TO PRESENT OWNERS OF A DETROIT SCREWMATIC 750: Because of the 750's exclusive unit construction design which allows piecemeal replacement of entire assemblies, the new Screwmatic spindle reversing clutch described here can be easily and economically installed on *any* Screwmatic 750.

SEND FOR MORE INFORMATION: on how the unique Detroit Screwmatic 750 can cut your production costs—send for your free copy of the new 16-page Screwmatic 750 catalog.

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**3903 Christopher • Detroit 11, Michigan**

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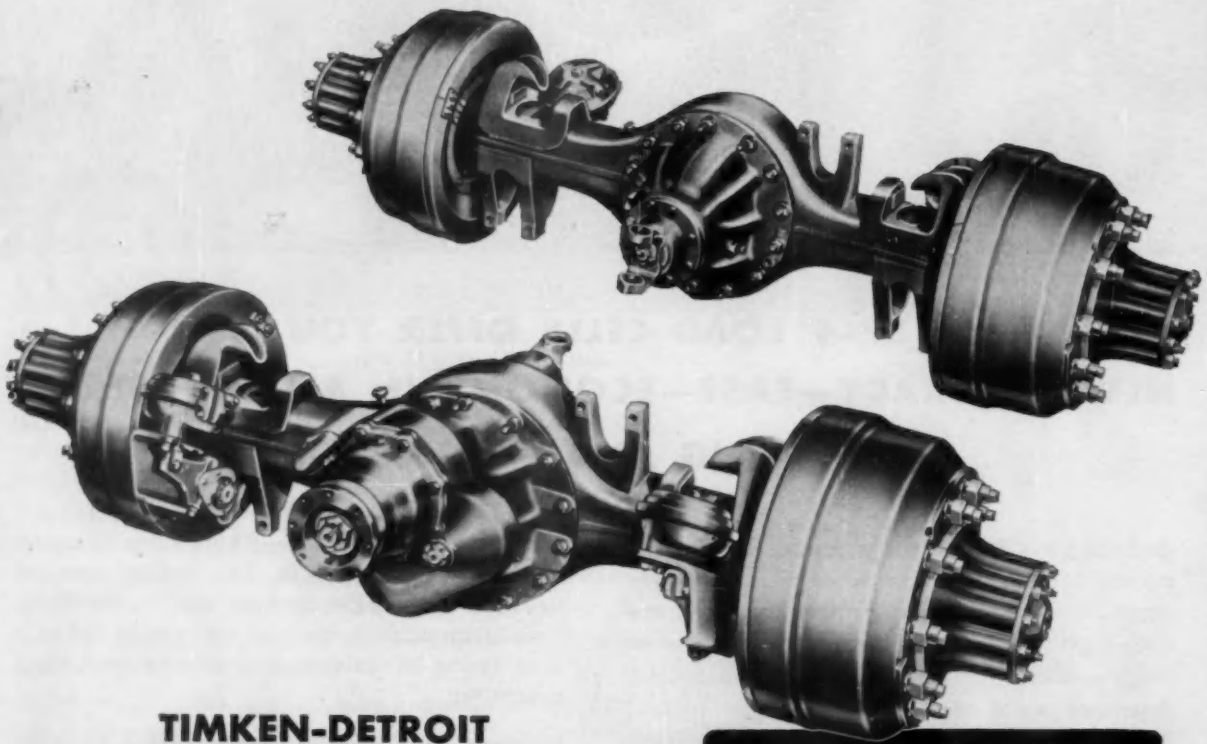

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gives you greater payload capacity. Up to 700 pounds lighter than any other unit of equal capacity, this new lightweight tandem will give you up to 26,000 extra ton-miles of payload in every 75,000 miles of operation.

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TIMKEN-DETROIT AXLE DIVISION
ROCKWELL SPRING AND AXLE COMPANY
DETROIT 32, MICHIGAN

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Products of

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with large rugged double-reduction gears is unequaled for dependable, economical operation under toughest conditions. Exclusive "Cradle Ride" suspension, with its long, resilient, floating springs, reduces road shock, stabilizes the load, and improves driver control. Some Timken-Detroit medium and heavy-duty tandems are available with worm drive.

## ONLY TIMKEN-DETROIT OFFERS YOU ALL THESE EXCLUSIVE FEATURES AND ADVANTAGES!

**Timken-Detroit Inter-Axle Differential** divides torque evenly between axles, yet permit wheels of one axle to revolve faster or slower than wheels of other axle. Both axles do equal amounts of work. Driving parts and tires last longer. Controlled from the cab, the differential can be locked out at any speed to give positive through-drive.

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**Famous Torsion Flow Axle Shafts** are made even stronger through the use of more splines and greater root diameter.

**Timken-Detroit Rectangular Shaped Axle Housings** are forged from high carbon steel. This shape, plus TDA full strength corner sections, provides greatest strength possible with minimum weight and size.

**Timken-Detroit Hypoid Gears** with their larger pinions and greater tooth contact give outstanding performance, top efficiency and long life—plus lower maintenance costs.

**Dependable Heavy-Duty "P" Series Air Brakes** utilize a unit-mounted design to make a compact self-contained assembly. Open type spiders mean lower temperatures, longer liner life. Tapered "Econoliners" provide greatest thickness in area of greatest wear.

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Practical, factual coverage of the basic concepts of automation and their applications in industry today — particularly in automotive and aircraft production.

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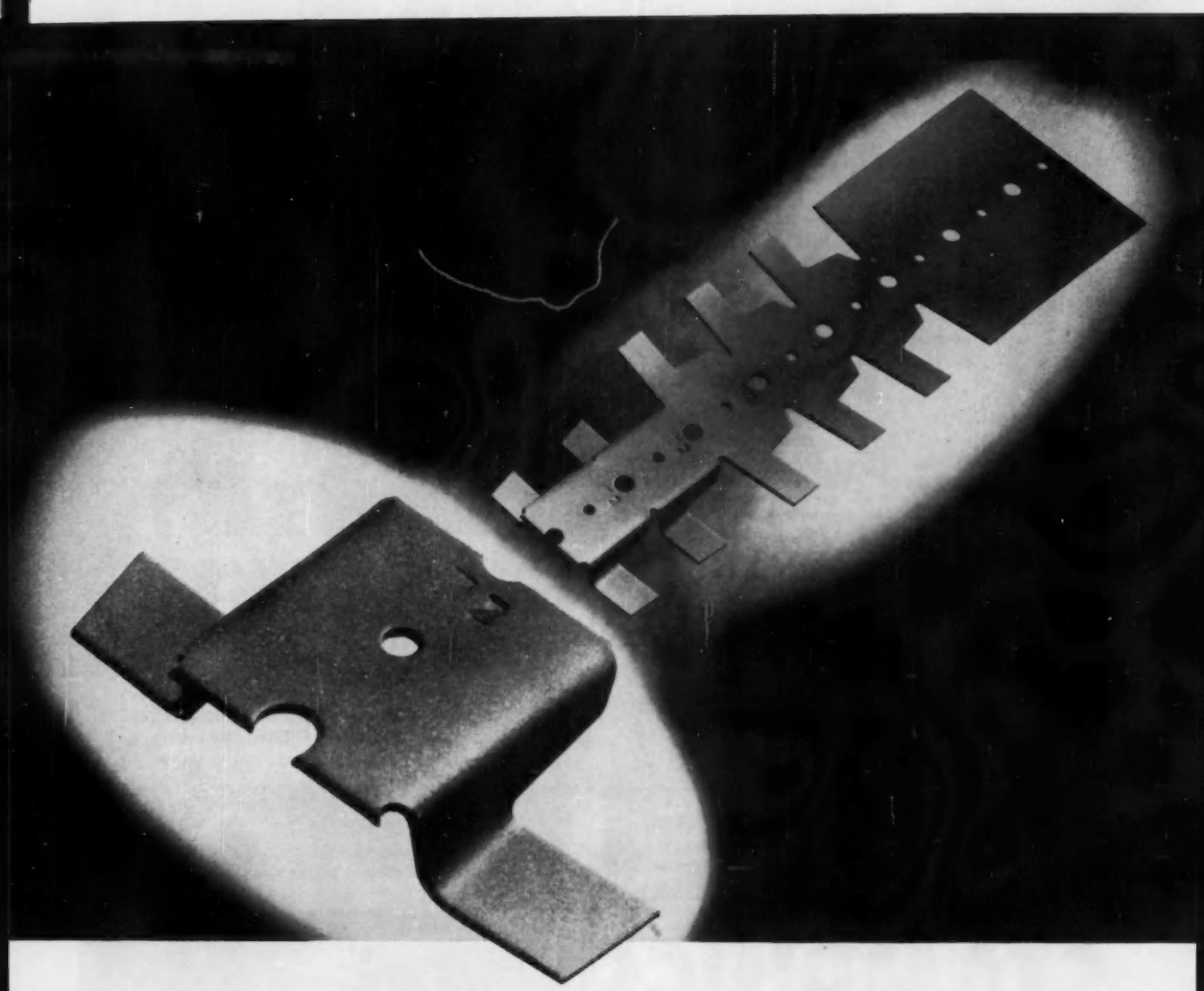


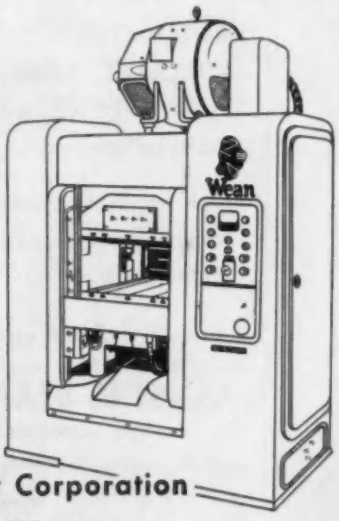
## Production rate increased 400% on progressive forming operation

**Production Rate:** **Conventional Press — 75 pieces per minute**
**Wean "Flying-Press" — 300 pieces per minute**

This small progressive forming is called a keeper plate. It is stamped and formed out of .035 gauge strip steel. Length of index is 3". This part was produced on a conventional press at the rate of 75 per minute. Using the same dies, a Wean "Flying-Press" increased production to 300 parts per minute.

But ultra high speed production is only one facet of the revolutionary "Flying-Press". Average set-up time for example is at least 25% faster than for conventional presses. A single upper bed adjustment plus a jog button on the central control panel speeds actual die setting and at the same time provides an important safety feature.

But why not get the complete story by writing today for your copy of the "Flying-Press" Brochure.




**Wean Equipment Corporation**
CLEVELAND 17, OHIO

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2A

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## MORE HOLES PER DRILL

Today's drilling problems on both standard and new metals require twist drills with *something extra* built into them. That's why Continental drills are so acceptable to leading *cost conscious* production plants. Ask your industrial jobber.

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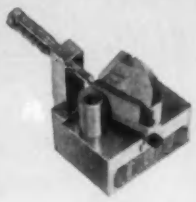
**CONTINENTAL DRILL CORPORATION**
555 W. Adams St., Chicago 6, Illinois



## PRE-SET CHASERS

AVOID CHASER-WASTING REGRINDS



Each Chaser is Pre-set in its Best Cutting Position, using the Murchey Micrometer Setting Fixture, thus equalizing cutting load and chaser wear. It also eliminates the waste of heavy prescribed regrinds and pitch diameter adjustments.

When Pre-set Chasers in their holding blocks are used in the Murchey Tangent Die Head, machine down time for chaser change-over is less than one minute.

For details on Lower Cost Per Thread, write to the Sheffield Corporation, Dayton 1, Ohio, U.S.A., Dept. 4.

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7806



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Produced economically in our modern plant for:

AUTOMOTIVE, INDUSTRIAL EQUIPMENT, AIRCRAFT, AGRICULTURAL INDUSTRIES AND OTHERS; will boost your output at material savings.

Our production, engineering and tool-room facilities are geared to the volume usage of *your* industry.

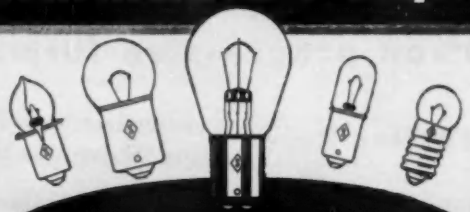
*Send us your inquiries*

**LANSING STAMPING COMPANY**
1157 So. Penn. Ave.
Lansing 4, Michigan

ESTABLISHED 1914



Stesco
## miniature lamps



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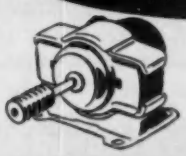

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# WE pay him to work for YOU...

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# TUTHILL SPRING engineer

**He knows how to make leaf springs serve your purposes better, more economically. He knows more answers than there are in the book — because he has all the Tuthill know-how gained in 76 years of building and improving leaf springs and their application.**

***ASK HIS ADVICE . . . without obligation!***

**TUTHILL SPRING CO.**
760 West Polk Street, Chicago 7, Illinois

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more designers & tool builders specify–

# HANLO UNIVERSAL GAGE UNITS

for these **7** reasons

1. All parts of Hanlo Units are standard and replaceable.
2. All moving parts are fully enclosed, and well protected from dust and foreign matter.
3. Any impact from external or internal shock, is absorbed by the gage unit, and not the indicator.
4. The indicator is fully protected on all sides.
5. Indicator movement is restricted within one revolution, to insure against both injury and misreading.
6. Indicator can be rotated in movements of 45°, to permit easy reading on large gages, or in cramped areas.
7. Hanlo Units are never obsoleted by model or engineering changes—simply transfer the standard units.

***TRACING TEMPLATES ARE AVAILABLE ON REQUEST***

**HANLO GAGE COMPANY**
*division of*
JOHNSON DIE AND ENGINEERING CO.
18415 Weaver Ave. • Detroit 28, Michigan

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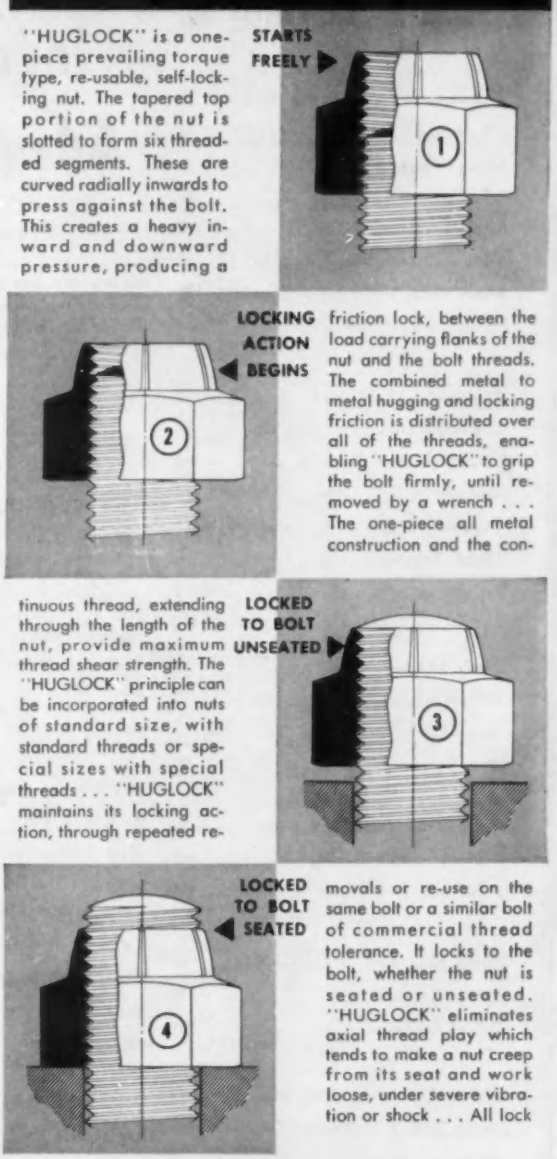
# HUGLOCK self-locking nuts with prevailing torque . . . . . .

"HUGLOCK" is a one-piece prevailing torque type, re-usable, self-locking nut. The tapered top portion of the nut is slotted to form six threaded segments. These are curved radially inwards to press against the bolt. This creates a heavy inward and downward pressure, producing a friction lock, between the load carrying flanks of the nut and the bolt threads. The combined metal to metal hugging and locking friction is distributed over all of the threads, enabling "HUGLOCK" to grip the bolt firmly, until removed by a wrench . . . The one-piece all metal construction and the continuous thread, extending through the length of the nut, provide maximum thread shear strength. The "HUGLOCK" principle can be incorporated into nuts of standard size, with standard threads or special sizes with special threads . . . "HUGLOCK" maintains its locking action, through repeated removals or re-use on the same bolt or a similar bolt of commercial thread tolerance. It locks to the bolt, whether the nut is seated or unseated. "HUGLOCK" eliminates axial thread play which tends to make a nut creep from its seat and work loose, under severe vibration or shock . . . All lock washers, cotter pins, key plates and other locking devices can be eliminated . . . The "HUGLOCK" section of our catalog contains 24 pages. It includes complete information, specifications, engineering data, prices; will be furnished on request.




**NATIONAL MACHINE PRODUCTS COMPANY**

*Manufacturer of Standard and Special 12 Pointer and Hexagon Nuts . . . "Huglock" and "Marsden" locknuts,*

**44233 Utica Rd., UTICA, Michigan**

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XXIII

*This is the twenty-third of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.*

# Annealing: Its Uses with Alloy Steels

Broadly speaking, the primary purpose of annealing is to soften steel and make it more workable. Annealing, as applied to alloy steels, may be defined as a process that heats above, and furnace-cools through, the critical range at a controlled, specified rate of speed; or that heats to a point within, and furnace-cools to a point below, the critical range. In either case, the choice depends upon the structure and maximum hardness desired.

The first method produces a lamellar pearlitic structure, while the second creates a spheroidized condition. These will be discussed separately in the following paragraphs:

(1) *Lamellar pearlitic structure.* It should be mentioned at once that this structure can be obtained both as described above and by a modified method known as isothermal annealing. In the isothermal process, the steel is heated above the critical temperature (austenitized), then transformed at a predetermined temperature, which depends upon the analysis. This operation requires two furnaces or salt baths —one for austenitizing, one for transformation.

Lamellar pearlitic structures are generally associated with machinability in carbon ranges from 0.20 to 0.60 pct, provided the hardness does not exceed the optimum maximum Brinell numeral. This is especially true where critical tooling is involved. It is a very versatile structure, as it gives best results in such operations as broaching, tapping, threading, deep drilling, boring, milling, and tooling as applied on single- and multiple-spindle bar automatic machines.

(2) *Spheroidized structure.* There are two general fields of use for this type of structure when alloy steels are employed. In the low and medium carbon ranges, spheroidization is necessary for cold-shaping operations, such as heading, extruding, drawing. In the higher carbon ranges (over 0.60 pct), it is mandatory where machining is involved, because it tends to lower the hardness of the steel.

As noted elsewhere in this discussion, both lamellar pearlitic and spheroidized structures can be created through annealing. If you care for more details about these and other uses of annealing, and the results to be expected, by all means consult with our technical staff. Bethlehem metallurgists will gladly help you work out any problems. And when you are ready for new supplies of alloy steels, Bethlehem can offer the full range of AISI standard grades, as well as special-analysis steels and all carbon grades.

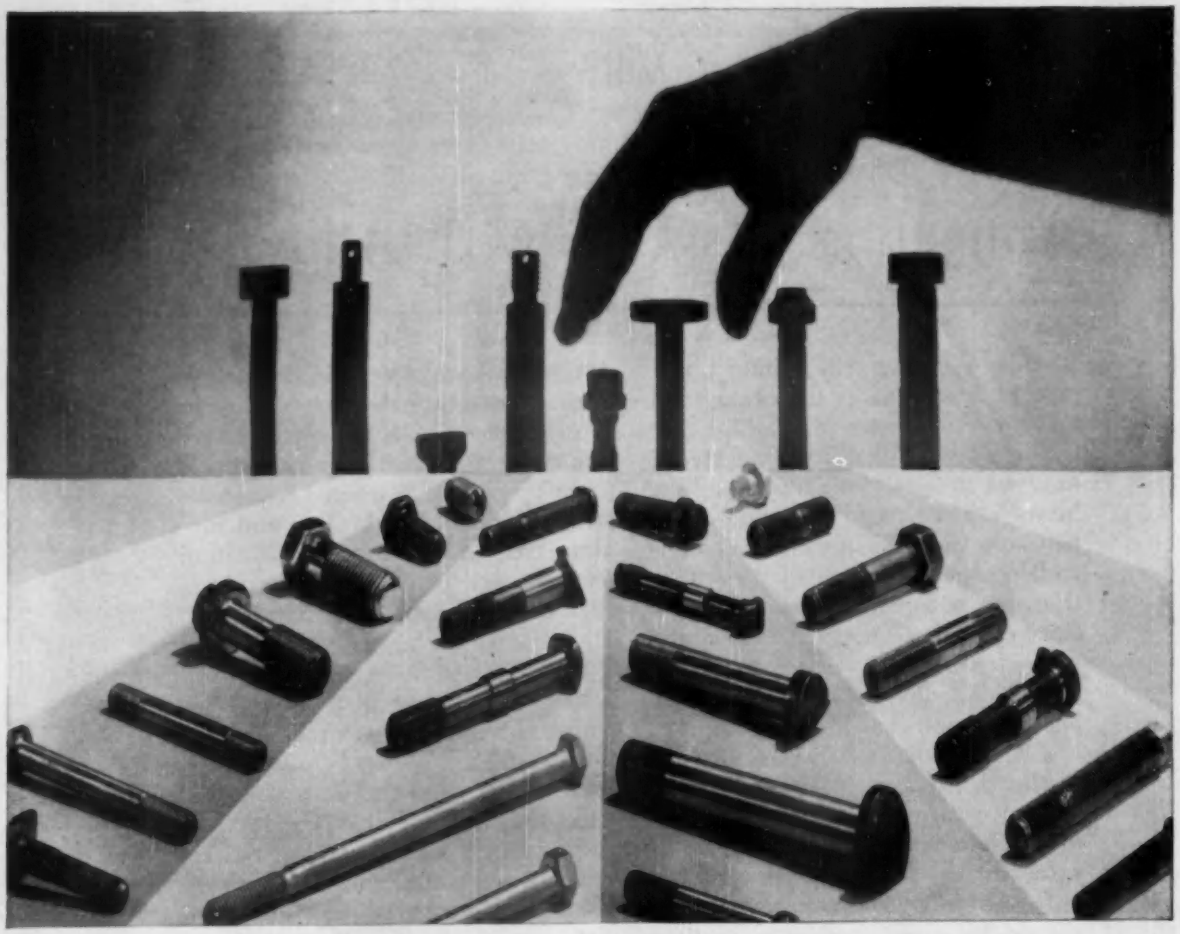
*If you would like reprints of this series of advertisements from No. I through No. XX, please write to us, addressing your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa. The first 20 subjects in the series are now available in a handy 36-page booklet, and we shall be glad to send you a free copy.*

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

**BETHLEHEM STEEL**



# IMPROVE DESIGN . . . get assistance

## from Ferry Cap—fastener experts for 50 years

Often we can suggest a fastener of special shape that will reduce your over-all product costs. Sometimes these special screws eliminate parts, replace more expensive parts, or reduce assembly time. Frequently they improve product performance. In all cases, Ferry Cap customers get the benefit.

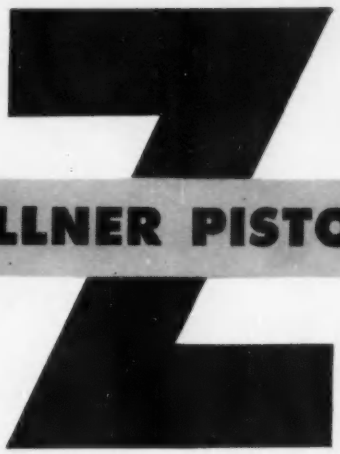
Give us a call and have a talk with one of our "Fastener Engineers."

**THE FERRY CAP & SET SCREW COMPANY**

*Makers of the famous Counter-Bor® Screw for socket head applications.*

2191 SCRANTON ROAD • CLEVELAND 13, OHIO

**FERRY CAP** *is geared to FASTER SERVICE*



**ZOLLNER PISTONS**

# ENGINEERING COOPERATION THAT DEVELOPS FINER ENGINES

ENGINEERING – FOUNDRY – MACHINING

Behind the world-wide reputation of Zollner Pistons is an unrivaled record of service to engine builders. Typical of advancements in piston design provided by Zollner engineering leadership are Clear-O-Matic, Bond-O-Loc, Perma-Groove and many adaptations of Zollner basic design advantages to specific engine builder requirements.

Whatever your needs may be for piston castings or precision finished pistons, we cordially invite your full use of our cooperative engineering service and complete production facilities.

## ZOLLNER CORPORATION

FORT WAYNE, INDIANA

DETROIT OFFICE: Jaikin Bldg., Birmingham, Mich.

CONSOLIDATED FREIGHTWAYS

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## THERE ARE NO BETTER AXLES, AT ANY PRICE!

Since 1915, Manufacturers of: *One-Piece* Tubular Heavy-Duty Trailer Axles; Front Axles for Trucks, Busses, and Off-Highway Equipment; Low-Bed Machinery Trailer Axles; Heavy-Duty Vacuum and Air Brakes.

**SHULER AXLE COMPANY, Incorporated, LOUISVILLE, KENTUCKY**

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